PATENT ABSTRACTS OF JAPAN

(11)Publication number : 07-079078
(43)Date of publication of application : 20.03.1995

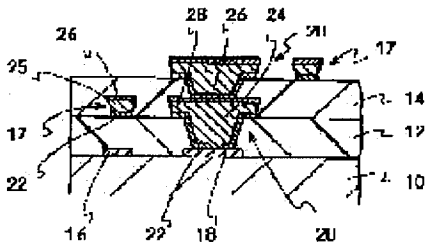
(51)Int.Cl. H05K 3/46

(21)Application number : 05-223416
(22)Date of filing : 08.09.1993

(71)Applicant : SHINKO ELECTRIC IND CO LTD
(72)Inventor : SAKAGUCHI NOBORU

(54) MULTILAYER WIRING BOARD AND MANUFACTURE THEREOF

(57)Abstract:
PURPOSE: To prevent the separation of via sections from an insulating resin layer and the degradation in insulating performance of the insulating resin, by forming a close contact barrier layer on the underside of the via sections in contact with the insulating resin layer to improve the adhesion between the via sections and the insulating resin layer and prevent the diffusion of metal composing the via sections into the insulating resin layer.
CONSTITUTION: A close contact barrier layer 22 is formed on the underside of via sections 20 in contact with an insulating resin layer 12. The close contact barrier layer 22 is for improving the adhesion between the insulating resin layer 12 and a metal layer 24 and for preventing metal forming the metal layer 24 from diffusing into the insulating resin layer 12. The close contact barrier layer 22 eliminates the degradation in insulating performance of the insulating resin 12 at the via sections 20. In addition the through holes for the via sections are tapered, and their diameter is smaller with the proximity to the bottom where the land sections 28 of a conductive pattern 17 formed on the underside of the insulating resin layer 12. Therefore, the close contact barrier layer 22, uniform in thickness, can be easily formed by sputtering, for example. When the tapered through holes are filled with metal by plating to form the via sections 22, the conductive pattern is formed simultaneously.



* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer. A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.
Are the multilayer interconnection board provided with the above, and this beer part pierces through an insulating resin layer of a next layer laminated on an insulating substrate or the surface of an insulating resin layer in which said conductive pattern was formed, A metal layer which plating restoration was carried out and was formed in a tapered shape breakthrough from which it becomes a byway as the bottom side which a land of said conductive pattern exposes, A land which extended from said metal layer and was formed on the surface of an insulating resin layer is comprised, An adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and a beer part and a beer part in a contact surface of a beer part which contacts said insulating resin layer at least is formed.

[Claim 2]The multilayer interconnection board according to claim 1 covered with a barrier layer which plans nonproliferation to an insulating resin layer of metal in which all the surfaces of a land which forms a beer part form said beer part.
[Claim 3]The multilayer interconnection board according to claim 1 by which a level difference prevention layer which comprises insulating resin is formed between a conductive pattern formed on the surface of [same] an insulating resin layer, and a land which constitutes a beer part.
[Claim 4]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, when manufacturing a multilayer interconnection board characterized by comprising the following, After drilling a tapered shape breakthrough used as a byway as the bottom side, on all the surfaces of said insulating resin layer containing the bottom and a wall surface of said tapered shape breakthrough. Form an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, and it ranks second, . Were obtained by patterning after a regist layer of a predetermined height formed on said adhesion barrier layer. A conductive pattern and a beer part in a portion to form to and an exposed portion of an adhesion barrier layer. Make a metal layer more than height of said regist layer form with plating, and After that, After forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said metal layer in metallic layer faces which performed and carried out flattening of the grinding treatment to said metal layer, A manufacturing method of a multilayer interconnection board removing an exposed portion of said adhesion barrier layer exposed by removing said regist layer, and forming a conductive pattern and a beer part.
A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer.
A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.

[Claim 5]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, when manufacturing a multilayer interconnection board characterized by comprising the following, After

drilling a tapered shape breakthrough used as a byway as the bottom side, on all the surfaces of said insulating resin layer containing the bottom and a wall surface of said tapered shape breakthrough. Form an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, and it ranks second, . Were obtained by patterning after a regist layer of a predetermined height formed on said adhesion barrier layer. A conductive pattern and a beer part in a portion to form to and an exposed portion of an adhesion barrier layer. Make a metal layer more than height of said regist layer form with plating, and After that, After performing and carrying out flattening of the grinding treatment to said metal layer, an exposed portion of said adhesion barrier layer which removed said regist layer and was exposed on the surface of a conductive pattern and a beer part which were removed and formed. A manufacturing method of a multilayer interconnection board forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part.
A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer.
A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.

[Claim 6]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, when manufacturing a multilayer interconnection board characterized by comprising the following, After drilling a tapered shape breakthrough used as a byway as the bottom side, on all the surfaces of said insulating resin layer containing the bottom and a wall surface of said tapered shape breakthrough. Form an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, and it ranks second, So that an adhesion barrier layer of a portion in which said conductive pattern and a beer part are formed may remain, After patterning after said adhesion barrier layer, between an adhesion barrier layer of a portion which forms said conductive pattern, and an adhesion barrier layer of a portion which forms a beer part, Into a portion which is made to form a level difference prevention layer of a predetermined height which comprises insulating resin, and an adhesion barrier layer is exposed after that, and forms a conductive pattern and a beer part. On the surface of a conductive pattern and a beer part which were formed by performing and carrying out flattening of the grinding treatment to a metal layer more than height of said level difference prevention layer formed with plating. A manufacturing method of a multilayer interconnection board forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part.
A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer.
A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.

[Claim 7]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, when manufacturing a multilayer interconnection board characterized by comprising the following, After drilling a tapered shape breakthrough from which it becomes a byway as the bottom side, form a level difference prevention layer of a predetermined height which comprises insulating resin between a portion which forms said conductive pattern, and a portion which forms a beer part, and it ranks second to it, . Were continued and formed in all the surfaces of said insulating resin layer and a level difference prevention layer containing the bottom and a wall surface of said tapered shape breakthrough. On an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, On the surface of a conductive pattern and a beer part which were made to form a metal layer of prescribed thickness with plating, and were formed via a level difference prevention layer exposed by performing and carrying out flattening of the grinding treatment to said metal layer after that. A manufacturing method of a multilayer interconnection board forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part.
A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer.

A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1]A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer. A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.
Are the multilayer interconnection board provided with the above, and this beer part pierces through an insulating resin layer of a next layer laminated on an insulating substrate or the surface of an insulating resin layer in which said conductive pattern was formed, A metal layer which plating restoration was carried out and was formed in a tapered shape breakthrough from which it becomes a byway as the bottom side which a land of said conductive pattern exposes, A land which extended from said metal layer and was formed on the surface of an insulating resin layer is comprised, An adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and a beer part and a beer part in a contact surface of a beer part which contacts said insulating resin layer at least is formed.

[Claim 2]The multilayer interconnection board according to claim 1 covered with a barrier layer which plans nonproliferation to an insulating resin layer of metal in which all the surfaces of a land which forms a beer part form said beer part.
[Claim 3]The multilayer interconnection board according to claim 1 by which a level difference prevention layer which comprises insulating resin is formed between a conductive pattern formed on the surface of [same] an insulating resin layer, and a land which constitutes a beer part.
[Claim 4]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, when manufacturing a multilayer interconnection board characterized by comprising the following, After drilling a tapered shape breakthrough used as a byway as the bottom side, on all the surfaces of said insulating resin layer containing the bottom and a wall surface of said tapered shape breakthrough. Form an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, and it ranks second, . Were obtained by patterning after a regist layer of a predetermined height formed on said adhesion barrier layer. A conductive pattern and a beer part in a portion to form to and an exposed portion of an adhesion barrier layer. Make a metal layer more than height of said regist layer form with plating, and After that, After forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said metal layer in metallic layer faces which performed and carried out flattening of the grinding treatment to said metal layer, A manufacturing method of a multilayer interconnection board removing an exposed portion of said adhesion barrier layer exposed by removing said regist layer, and forming a conductive pattern and a beer part.
A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer.
A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.

[Claim 5]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, when manufacturing a multilayer interconnection board characterized by comprising the following, After

drilling a tapered shape breakthrough used as a byway as the bottom side, on all the surfaces of said insulating resin layer containing the bottom and a wall surface of said tapered shape breakthrough. Form an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, and it ranks second, . Were obtained by patterning after a regist layer of a predetermined height formed on said adhesion barrier layer. A conductive pattern and a beer part in a portion to form to and an exposed portion of an adhesion barrier layer. Make a metal layer more than height of said regist layer form with plating, and After that, After performing and carrying out flattening of the grinding treatment to said metal layer, an exposed portion of said adhesion barrier layer which removed said regist layer and was exposed on the surface of a conductive pattern and a beer part which were removed and formed. A manufacturing method of a multilayer interconnection board forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part.
A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer.
A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.

[Claim 6]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, when manufacturing a multilayer interconnection board characterized by comprising the following, After drilling a tapered shape breakthrough used as a byway as the bottom side, on all the surfaces of said insulating resin layer containing the bottom and a wall surface of said tapered shape breakthrough. Form an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, and it ranks second, So that an adhesion barrier layer of a portion in which said conductive pattern and a beer part are formed may remain, After patterning after said adhesion barrier layer, between an adhesion barrier layer of a portion which forms said conductive pattern, and an adhesion barrier layer of a portion which forms a beer part, Into a portion which is made to form a level difference prevention layer of a predetermined height which comprises insulating resin, and an adhesion barrier layer is exposed after that, and forms a conductive pattern and a beer part. On the surface of a conductive pattern and a beer part which were formed by performing and carrying out flattening of the grinding treatment to a metal layer more than height of said level difference prevention layer formed with plating. A manufacturing method of a multilayer interconnection board forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part.
A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer.
A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.

[Claim 7]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, when manufacturing a multilayer interconnection board characterized by comprising the following, After drilling a tapered shape breakthrough from which it becomes a byway as the bottom side, form a level difference prevention layer of a predetermined height which comprises insulating resin between a portion which forms said conductive pattern, and a portion which forms a beer part, and it ranks second to it, . Were continued and formed in all the surfaces of said insulating resin layer and a level difference prevention layer containing the bottom and a wall surface of said tapered shape breakthrough. On an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, On the surface of a conductive pattern and a beer part which were made to form a metal layer of prescribed thickness with plating, and were formed via a level difference prevention layer exposed by performing and carrying out flattening of the grinding treatment to said metal layer after that. A manufacturing method of a multilayer interconnection board forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part.
A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer.

A beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Industrial Application]The conductive pattern in which the insulating resin layer of two or more layers was laminated on the insulating substrate, and this invention was formed in the said insulating substrate and surface side of an insulating resin layer concerning a multilayer interconnection board and a manufacturing method for the same, It is related with a multilayer interconnection board possessing the beer part which comprises the metal which pierced through said insulating resin layer and was formed, and a manufacturing method for the same so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected.
[0002]
[Description of the Prior Art]In connection with the device having been integrated highly and having complicated, the densification of the conductive pattern which transmits a signal is demanded of electronic devices, such as a semiconductor device. However, although densification of the density of the conductive pattern which can be industrially formed in the surface side of an insulating substrate is carried out by progress of art every year, it has a limit. For this reason, the multilayer interconnection board which multilayered the conductive pattern is adopted that much more conductive pattern that carried out densification should be formed in a substrate. this multilayer interconnection board is shown in drawing 9 -- as -- the conductive pattern 106 -- a land at the end of .. and a conductive pattern. (A land may only be called hereafter) On the insulating substrate 100 made from the ceramics in which 108 was formed, the insulating resin layers 102 and 104 which comprise resin, such as polyimide, are laminated -- each surface side of the insulating resin layers 102 and 104 -- the conductive pattern 106 .. and the land 108 are formed. these conductive patterns 106 -- the connection to the conductive pattern 106 formed in the surface side of a different insulating resin layer among .. is made by the beer part which comprises the metal layer 110 which was set up on the land 108, and pierced through the insulating resin layer, and was formed approximately cylindrical.
[0003]The multilayer interconnection board shown in this drawing 9 is conventionally manufactured by the method shown in drawing 10. That is, after forming the metallized layer 112 in all the surfaces of the insulating substrate 100 made from ceramics by weld slag etc., The metal layer 110 which changes from the copper metal laminated by electrolysis plating more than the height of the regist layer 114 to the approximately cylindrical breakthrough 116 for beer parts which was drilled in the regist layer 114 applied with prescribed thickness on the metallized layer 112, and which the metallized layer 112 exposes is formed. [Drawing 10 (a), (b)] .After removing the regist layer 114, patterning after the metallized layer 112 and forming the conductive pattern 106 and the land 108 [Drawing 10 (c)] Carry out grinding treatment of the surface of the insulating resin layer 102 of wrap prescribed thickness for the metal layer 110 which applied and formed resin, such as polyimide, and the upper bed side of the metal layer 110 is exposed, and flattening of the metal layer 110 and the insulating resin layer 102 is carried out. [Drawing 10 (d), (e)] .subsequently -- patterning after the metallized layer 118 formed by weld slag etc. all over the exposed surface of the metal layer 110, and the flat face of the insulating resin layer 102 by forming the regist layer 120 -- the upper conductive pattern 106 .. and the land 108 are formed [Drawing 10 (f), (g), (h)] .Hereafter, an insulating resin layer can manufacture the multilayer interconnection board laminated two or more layers on the insulating substrate 100 by giving the process from drawing 10 (a) one by one to the insulating resin layer 102 top of drawing 10 (h).
[0004]As shown in drawing 11, when the beer part 122 is beforehand formed in the insulating substrate 100, a multilayer interconnection board can be manufactured at the process skipped rather than the process shown in drawing 10. the conductive pattern 106 first patterned and formed in the metallized layer continued and formed

in the whole surface on the insulating substrate 100 in this process .. and the land 108 -- a wrap -- like, The surface of the land 108 drills the breakthrough 116 for beer parts exposed to the bottom in the insulating resin layer 102 of the prescribed thickness which comprises resin, such as polyimide. [Drawing 11 (a)] .The metal layer 110 is formed with electrolysis plating, supplying electric power to this breakthrough 116 for beer parts through the beer part 122. [Drawing 11 (b)] .A tip is kept from projecting from the surface of the insulating resin layer 102 in the height of this metal layer 110. Subsequently, it patterns after the metallized layer 118 formed by weld slag etc. all over the insulating resin layer 102 including the surface of the metal layer 110 by forming the regist layer 124, and the conductive pattern 106 and the land 108 are formed in it. [Drawing 11 (c), (d), (e)] .Hereafter, an insulating resin layer can manufacture the multilayer interconnection board laminated two or more layers on the insulating substrate 100 by giving the process from drawing 11 (a) one by one to the insulating resin layer 102 top of drawing 11 (e).

[0005]

[Problem(s) to be Solved by the Invention]According to the manufacturing method of the multilayer interconnection board shown in this drawing 10 and drawing 11, a complicated conductive pattern can manufacture the multilayer interconnection board formed in the multilayer. However, since a process is long and the manufacturing method of the multilayer interconnection board shown in drawing 10 has it, shortening, simplification, etc. of the process are demanded. [complicated] The manufacturing method of the multilayer interconnection board shown in drawing 11 on the other hand needs to form the beer part beforehand to an insulating substrate, although a process is simplified as compared with the manufacturing method shown in drawing 10. And since some level difference parts are easy to be formed near the boundary of a beer part and an insulating resin layer, the concern which an open circuit generates in the conductive pattern formed on this level difference part or a land also exists in the multilayer interconnection board obtained by the manufacturing method shown in drawing 11. Since the adhesion of the metal layer 110 of a beer part and an insulating resin layer is inferior, there is also a possibility that metal, such as exfoliation with a beer part and an insulating resin layer or copper, may be spread in an insulating resin layer, and may cause the fall of the insulation performance of an insulating resin layer. Then, the purpose of this invention is to provide the manufacturing method of the multilayer interconnection board which can simplify offer of the multilayer interconnection board which can cancel exfoliation with the beer part and insulating resin layer which comprise metal, the fall of the insulation performance of an insulating resin layer, etc., and the manufacturing process of a multilayer interconnection board.

[0006]

[Means for Solving the Problem]As a result of repeating examination that this invention person should attain said purpose, when filling up a breakthrough for beer parts with metal and forming a beer part in it with electrolysis plating, by forming a beer part and a conductive pattern simultaneously, Aim at improvement in adhesion with an insulating resin layer and a beer part to the rear-face side of that shortening and simplification of a process are attained, and a beer part in contact with an insulating resin layer, and. By forming an adhesion barrier layer which can plan nonproliferation to an insulating resin layer of metal which forms a beer part, it found out that exfoliation with a beer part and an insulating resin layer, a fall of insulation performance of an insulating resin layer, etc. could be canceled, and this invention was reached. Namely, a conductive pattern in which an insulating resin layer of two or more layers was laminated on an insulating substrate, and this invention was formed in the said insulating substrate and surface side of an insulating resin layer, So that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected, In a multilayer interconnection board possessing a beer part which comprises metal which pierced through said insulating resin layer and was formed, This beer part pierces through an insulating resin layer of a next layer laminated on an insulating substrate or the surface of an insulating resin layer in which said conductive pattern was formed, A metal layer which plating restoration was carried out and was formed in a tapered shape breakthrough from which it becomes a byway as the bottom side which a land of said conductive pattern exposes, A land which extended from said metal layer and was formed on the surface of an insulating resin layer is comprised, It is in a multilayer interconnection board, wherein an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and a beer part and a beer part in a contact surface of a beer part which contacts said insulating resin layer at least is formed. In a multilayer interconnection board of this composition, when all the surfaces of a land which forms a beer part cover by a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said beer part, diffusion of metal from the surface of a land to an insulating resin layer can be prevented.

[0007]A conductive pattern in which an insulating resin layer of two or more layers was laminated on an insulating substrate, and this invention was formed in the said insulating substrate and surface side of an insulating resin layer, So that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected, When manufacturing a multilayer interconnection board possessing a beer part which comprises metal which pierced through said insulating resin layer and was formed, So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer and the bottom may be formed, After drilling a tapered shape breakthrough used as a byway as the bottom side, on all the surfaces of said insulating resin layer containing the bottom and a wall surface of said tapered shape breakthrough. Form an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, and it ranks second, . Were obtained by patterning after a regist layer of a predetermined height formed on said adhesion barrier layer. A conductive pattern and a beer part in a portion to form to and metallic layer faces which were made to form a metal layer more than height of said regist layer in an exposed portion of an adhesion barrier layer with plating, and performed and carried out flattening of the grinding treatment to it after that at said metal layer. After forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said metal layer, it is also a manufacturing method of a multilayer interconnection board removing an exposed portion of said adhesion barrier layer exposed by removing said regist layer, and forming a conductive pattern and a beer part.
[0008]After making a metal layer more than height of a regist layer form with plating in a manufacturing method of a multilayer interconnection board of this composition, Perform and carry out flattening of the grinding treatment to said metal layer, and after that an exposed portion of an adhesion barrier layer which removed said regist layer and was exposed on the surface of a conductive pattern and a beer part which were removed and formed. By forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part, an exposed surface of a conductive pattern and a beer part can be covered by a barrier layer. So that an adhesion barrier layer of a portion in which a conductive pattern and a beer part are formed may remain, After patterning after said adhesion barrier layer, between an adhesion barrier layer of a portion which forms said conductive pattern, and an adhesion barrier layer of a portion which forms a beer part, Into a portion which is made to form a level difference prevention layer of a predetermined height which comprises insulating resin, and an adhesion barrier layer is exposed after that, and forms a conductive pattern and a beer part. After making a metal layer more than height of said level difference prevention layer form with plating, By forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part in the surface of a conductive pattern and a beer part which were formed by performing and carrying out flattening of the grinding treatment to said metal layer, Even if a land and a conductive pattern are thick, the surface smoothness of a multilayer interconnection board is securable.
[0009]So that said land may expose to an insulating resin layer of a wrap next layer a land of a conductive pattern formed in an insulating substrate or the surface of an insulating resin layer and the bottom may be formed, After drilling a tapered shape breakthrough from which it becomes a byway as the bottom side, form a level difference prevention layer of a predetermined height which comprises insulating resin between a portion which forms said conductive pattern, and a portion which forms a beer part, and it ranks second to it, . Were continued and formed in all the surfaces of said insulating resin layer and a level difference prevention layer containing the bottom and a wall surface of said tapered shape breakthrough. On an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part, and a beer part, On the surface of a conductive pattern and a beer part which were made to form a metal layer of prescribed thickness with plating, and were formed via a level difference prevention layer exposed by performing and carrying out flattening of the grinding treatment to said metal layer after that. By forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part, an adhesion barrier layer can be formed in a side attachment wall of a level difference prevention layer, and a multilayer interconnection board can be manufactured easily.
[0010]
[Function]According to this invention, by the adhesion barrier layer which plans nonproliferation to the insulating resin layer of the metal which forms the improvement in adhesion with the insulating resin layer and metal layer which were formed in the rear-face side of the beer part in contact with an insulating resin layer, and a metal layer. Exfoliation with a beer part and an insulating resin layer and the insulating fall of an insulating resin layer

are cancelable. Since the breakthrough for beer parts is a tapered shape breakthrough from which it becomes a byway as the bottom side which the land of the conductive pattern formed in the rear-face side of an insulating resin layer exposes, the adhesion barrier layer of uniform thickness can be easily formed by weld slag etc. When filling up a tapered shape breakthrough with metal and forming a beer part in it with plating, a conductive pattern can be formed simultaneously and a process can be remarkably simplified as compared with the conventional manufacturing method the process of forming a beer part, and whose process of forming a conductive pattern are separated processes.

[0011]

[Example]A drawing explains this invention still in detail. Drawing 1 is a fragmentary sectional view showing one example of this invention, and the land 18 is formed in the upper surface of the insulating substrate 10 made from ceramics which consists of nitriding aluminum at the end of the conductive pattern 16 and the conductive pattern. As for these conductive patterns 16 and the land 18, a titanium (Ti) thin film layer, a molybdenum (Mo) thin film layer, and a nickel (nickel) thin film layer are laminated one by one from the insulating substrate side. Titanium (Ti) thin film layer which forms this conductive pattern 16 and land 18, It is for a nickel (nickel) thin film layer aiming at respectively improvement in the adhesion of the insulating substrate 10 made from the ceramics which consist of nitriding aluminum, and molybdenum (Mo) thin film layer which transmits a signal for the nonproliferation to the insulating resin layer of a molybdenum (Mo) thin film layer. The land 18 is connected with the bottom of the beer part 20 which pierced through the insulating resin layer 12 and was formed although this conductive pattern 16 is covered with the insulating resin layer 12 which comprises the polyimide resin of prescribed thickness.

[0012]The metal layer 24 which plating restoration was carried out and was formed in the tapered shape breakthrough which the beer part 20 is tapered shape from which a copper metal is comprised and it becomes a byway as the land 18 side, and was formed in the insulating resin layer 12, The land 28 which extended from the metal layer 24 and was formed rather than the opening of the tapered shape breakthrough on the surface of the insulating resin layer 12 at the wide area is comprised. The adhesion barrier layer 22 which plans nonproliferation to the improvement in adhesion with the insulating resin layer 12 and the metal layer 24 and the insulating resin layer 12 of a copper metal is formed in the portion in contact with the insulating resin layer 12 of this metal layer 24 and land 28. From the wall surface side of a tapered shape breakthrough, a chromium (Cr) thin film layer and a copper (Cu) thin film layer are laminated one by one, and the adhesion barrier layer 22 is formed. A chromium (Cr) thin film layer is for the improvement in adhesion with the insulating resin layer 12, the nonproliferation of a copper metal, and a copper (Cu) thin film layer aiming at respectively the fall of the electric resistance value of the adhesion barrier layer 22 among these thin film layers. About 0.2 micrometer may be sufficient as the thickness of copper (Cu) thin film layer which constitutes this adhesion barrier layer 22. A nickel (nickel) thin film layer is formed in each upper surface of the conductive pattern 17 of the same thickness as the land 28 formed in the upper surface of the insulating resin layer 12, and the land 28 as the barrier layer 26 for the nonproliferation to the insulating resin layer of a copper metal. The adhesion barrier layer 22 is formed also in the undersurface side of the copper layer 25 which forms the conductive pattern 17 in this example.

[0013]As for the multilayer interconnection board indicated to drawing 1, the insulating resin layer 14 is laminated on the insulating resin layer 12, The land 28 of the beer part 20 formed in the lower layer insulating resin layer 12 and the beer part 20 formed in the upper insulating resin layer 14 are connected, and the conductive pattern 17 is formed in the upper surface of the insulating resin layer 14. Since the beer part 20 formed in the upper insulating resin layer 14 and the conductive pattern 17 are the same structures as the beer part 20 and the conductive pattern 17 which were formed in the lower layer insulating resin layer 12, detailed explanation is omitted. By the way, in a multilayer interconnection board, as shown in drawing 9, usually let upper bed area of the land 108 be large rather than the lower end surface product of the metal layer 110 which forms a beer part. It is for securing both connection, even if the center position of the metal layer 110 and the land 108 shifts somewhat. In this point and this example, since the portion of the metal layer 24 which forms the beer part 20 is formed in tapered shape, even if it makes upper bed area of the metal layer 24 equal to the upper bed area of the metal layer 110 which forms the conventional beer part, the lower end surface product of the metal layer 24 is made to a small area. For this reason, both connection is certainly securable even if the center of the beer part 20 linked to the center of the land 28 shifts somewhat, as shown in drawing 2.

[0014]In the multilayer interconnection board shown in drawing 1 - drawing 2, the copper metal has exposed the side of the land 28 which projects from the surface of the insulating resin layers 12 and 14, and the conductive pattern 17. For this reason, because of the nonproliferation to the insulating resin layer of a copper metal, when the land 28 and the conductive pattern 17 are thick, as shown in drawing 3, it is preferred to extend the barrier

layer 26 which comprises a nickel (nickel) thin film layer even to the side side. When the land 28 and the conductive pattern 17 are thick, Since a level difference part is easy to be formed between the land 28 and the conductive pattern 17, as shown in drawing 4, the surface smoothness of a multilayer interconnection board can be held by forming the level difference prevention layers 31 and 33 which comprise insulating resin between the land 28 and the conductive pattern 17.

[0015]The multilayer interconnection board shown in drawing 1 among the multilayer interconnection boards shown in such drawing 1 - 4 can be manufactured with the manufacturing method shown in drawing 5. The insulating resin layer 12 which comprises the polyimide resin of wrap prescribed thickness in the conductive pattern 16 and the land 18 which were first formed in drawing 1 on the insulating substrate 10 made from the ceramics which comprise nitriding aluminum is formed, The tapered shape breakthrough 30 which the land 18 is exposed and forms the bottom is drilled in the insulating resin layer 12. [Drawing 5 (a)] .Like the bottom side, this tapered shape breakthrough 30 is the tapered shape used as a byway, and can be formed by isotropic etching. The conductive pattern 16 and the land 18 are patterned and formed in titanium (Ti) thin film layer which continued all over the insulating substrate 10 and was formed by weld slag, a molybdenum (Mo) thin film layer, and the metallized layer which comprises a nickel (nickel) thin film layer. It continues all over the insulating resin layer 12 containing the bottom which the wall surface and the land 18 of this tapered shape breakthrough 30 exposed, The regist layer 34 of a predetermined height is formed on the metallized layer 32 so that the metallized layer 32 of the portion which forms the metallized layer 32 which comprises a chromium (Cr) thin film layer and a copper (Cu) thin film layer by weld slag, and forms a conductive pattern and a beer part may be exposed. [Drawing 5 (b), (c)] .When the tapered shape breakthrough 30 is an approximately cylindrical breakthrough, it is hard to make here the metallized layer 32 formed in the wall surface of a breakthrough by weld slag into uniform thickness.

[0016]Subsequently, supplying electric power from the metallized layer 32, with electrolysis plating, a copper metal is laminated to the exposed portion of the metallized layer 32, and the copper metal layers 36 and 37 are formed. Electrolysis plating is continued until the lowest portion of the copper metal layers 36 and 37 serves as height more than the surface of the regist layer 34. [Drawing 5 (d)] .Flattening of these copper metal layers 36 and 37 is carried out by grinding treatment, and thickness is adjusted and they serve as the metal layer 24 and the land 28 which form the copper layer 25 and the beer part 20 (drawing 1) which form the conductive pattern 17 (drawing 1). [Drawing 5 (e)] .In the surface of the copper layer 25 shown in drawing 5 (e), and the land 28. In order to plan nonproliferation of a copper metal, after forming a nickel (nickel) thin film layer with electrolysis plating as the barrier layer 26, After removing the regist layer 34, the conductive pattern 17 and the beer part 20 connected with the land 18 formed on the insulating substrate 10 can be simultaneously formed on the insulating resin layer 12 by removing the exposed portion of the metallized layer 32 by etching etc. [Drawing 5 (f), (g)] .When nickel (nickel) thin film layer as the barrier layer 26 cannot be formed with electrolysis plating, it may form with nonelectrolytic plating. Hereafter, an insulating resin layer can manufacture the multilayer interconnection board laminated two or more layers on the insulating substrate 10 by giving the process from drawing 5 (a) one by one to the insulating resin layer 12 top of drawing 5 (g).

[0017]When using as a manufacture plug the multilayer interconnection board shown in drawing 3, it can manufacture by the method shown in drawing 6. This method showed drawing 6 (a) the same substrate as the substrate shown in drawing 5 (e) in order to pass the same process as the process shown in drawing 5 to the process of drawing 5 (e). The metallized layer 32 which removed the regist layer 34 and was exposed is removed by etching etc. to the substrate shown in drawing 6 (a). For this reason, the beer part 20 which was connected with the copper layer 25 which forms the conductive pattern 17 on the insulating resin layer 12, and the land 18 formed on the insulating substrate 10 and which comprises the metal layer 24 and the land 28 is formed simultaneously. [Drawing 6 (b), (c)] .Subsequently, nickel (nickel) thin film layer as the barrier layer 26 is formed in the copper layer 25 and all the surfaces of the land 28 with nonelectrolytic plating. [Drawing 6 (d)] .Hereafter, an insulating resin layer can manufacture the multilayer interconnection board laminated two or more layers on the insulating substrate 10 to the insulating resin layer 12 top of drawing 6 (d) by giving the process of drawing 5 (a) to drawing 5 (e), and the process of drawing 6 (a) to drawing 6 (d) one by one.

[0018]The multilayer interconnection board shown in drawing 4 can be manufactured by the method shown in drawing 7. This method showed drawing 7 (a) the same substrate as the substrate shown in drawing 5 (b) in order to pass the same process as the process shown in drawing 5 to the process of drawing 5 (b). After forming the regist layer 34 in the portion which forms the conductive pattern 17 (drawing 4) and the beer part 20 (drawing 4) to the substrate shown in drawing 7 (a), etching etc. remove the exposed portion of the metallized layer 32, and the adhesion barrier layers 22 and 22 are formed. [Drawing 7 (b), (c)] .Subsequently, after applying

the insulating resin layer of prescribed thickness to all the surfaces of the insulating resin layer 12, an insulating resin layer is selectively removed on them, and the level difference prevention layer 31 is formed in them so that the portion of the adhesion barrier layers 22 and 22 may be exposed. [Drawing 7 (d)] .After partial removal of this insulating resin layer forms the insulating resin layer of prescribed thickness, The regist layer for patterning may be formed and patterned on an insulating resin layer, and it may carry out by performing an etching process, and an insulating resin layer may be formed with a photopolymer and it may carry out by patterning by exposing and developing the insulating resin layer itself. Supplying electric power from the adhesion barrier layers 22 and 22, with electrolysis plating, a copper metal is laminated to the adhesion barrier layers 22 and 22, and the copper metal layers 36 and 37 are formed in them. Electrolysis plating is continued until the lowest portion of the copper metal layers 36 and 37 serves as height more than the surface of the level difference prevention layer 31. [Drawing 7 (e)] .

[0019]Flattening of these copper metal layers 36 and 37 is carried out by grinding treatment, and thickness is adjusted and they form the copper layer 25 which constitutes the conductive pattern 17 (drawing 4), the metal layer 24 which constitutes the beer part 20 (drawing 4), and the land 28. [Drawing 7 (f)] .In the surface of the copper layer 25 shown in drawing 7 (f), and the land 28. Since nonproliferation of a copper metal is planned, the conductive pattern 17 and the beer part 20 connected to the land 18 formed on the insulating substrate 10 can be simultaneously formed on the insulating resin layer 12 by forming a nickel (nickel) thin film layer with electrolysis plating as the barrier layer 26. [Drawing 7 (g)] .Although plating in the method shown in drawing 7 performed electrolysis plating, when electric supply is impossible, it may be nonelectrolytic plating. Hereafter, an insulating resin layer can manufacture the multilayer interconnection board laminated two or more layers on the insulating substrate 10 by giving the process of drawing 5 (a) to drawing 5 (b), and the process of drawing 7 (a) to drawing 7 (g) one by one on the level difference prevention layer 31 of drawing 7 (g).

[0020]In the manufacturing method of the multilayer interconnection board shown in drawing 7, After patterning after the metallized layer 32, in order to form the copper metal layers 36 and 37 with plating, When the conductive pattern of 1 which is due to be formed is an independent pattern which became independent of other conductive patterns, electric power cannot be supplied to the portion which forms an independent pattern from the adhesion barrier layer 22, but it must replace with electrolysis plating, and nonelectrolytic plating must be adopted. According to the manufacturing method shown in this point and drawing 8, even if the conductive pattern which is due to be formed is an independent pattern, a copper metal layer can be formed with electrolysis plating. That is, the level difference prevention layer 31 is formed on the insulating resin layer 12 in which the tapered shape breakthrough 30 which is shown in drawing 5 (a), and which the conductive pattern 16 formed on the insulating substrate 10 made from the ceramics which comprise nitriding aluminum is covered, and the land 18 is exposed, and forms the bottom was drilled. [Drawing 8 (a)] .This level difference prevention layer 31 is formed by removing an insulating resin layer selectively so that the portion of the conductive pattern 17 and the beer part 20 which are formation schedules may be exposed, after forming the insulating resin layer of prescribed thickness in all the surfaces of the insulating resin layer 12. After partial removal of an insulating resin layer forms the insulating resin layer of prescribed thickness, The regist layer for patterning may be applied and patterned on an insulating resin layer, and it may carry out by performing an etching process, and an insulating resin layer may be formed with a photopolymer and it may carry out by patterning by exposing and developing the insulating resin layer itself.

[0021]Subsequently, all the surfaces of the insulating resin layer 12 and the level difference prevention layer 31 containing the bottom which the wall surface and the land 18 of the tapered shape breakthrough 30 exposed are covered, and the metallized layer 32 which comprises a chromium (Cr) thin film layer and a copper (Cu) thin film layer is formed. [Drawing 8 (b)] .With electrolysis plating which supplies electric power from the metallized layer 32, it continues all over the metallized layer 32, and the copper metal layer 38 of prescribed thickness is formed. [Drawing 8 (c)] .For this reason, even if one of the conductive patterns to form is an independent pattern, the copper metal layer 38 can always be formed with electrolysis plating. Grinding treatment is performed to the formed copper metal layer 38, flattening and thickness adjustment are performed, and the copper layer 25 which forms a conductive pattern by the exposed level difference prevention layer 31, the copper layer 24 which forms a beer part, and the land 28 are separated. [Drawing 8 (d)] .Then, in order to plan nonproliferation of a copper metal, a nickel (nickel) thin film layer is formed in the surface of the copper layer 25 shown in drawing 8 (d), and the land 28 with electrolysis plating or nonelectrolytic plating as the barrier layer 26. [Drawing 8 (e)] .Hereafter, an insulating resin layer can manufacture the multilayer interconnection board laminated two or more layers on the insulating substrate 10 by giving the process of drawing 5 (a), and the process of drawing 8 (a) to drawing 8 (e) one by one on the level difference prevention layer 31 of drawing 8 (e).

[0022]In the multilayer interconnection board obtained by the process shown in this drawing 8, the conductive pattern 17 in which the copper layer 25 was surrounded by the adhesion barrier layer 22 and the barrier layer 26, the copper layer 24, and the land 28 can form the beer part 20 surrounded by the adhesion barrier layer 22 and the barrier layer 26. For this reason, diffusion of the copper metal which forms the copper layers 24 and 25 can fully be prevented. Also in the manufacturing process, since the copper metal layer 38 can be formed with electrolysis plating and the pattern NINGU process of the metallized layer 32 can be made unnecessary, a multilayer interconnection board can be manufactured easily.

[0023]

[Effect of the Invention]According to this invention, prevention from exfoliation with the metal layer and insulating resin layer which constitute a beer part, and nonproliferation to the insulating resin layer of the metal which forms a metal layer can be planned, and the reliability of a multilayer interconnection board can be improved. Since a beer part and a conductive pattern can be formed simultaneously, the manufacturing process of a multilayer interconnection board can be simplified and it is also possible to aim at reduction of the manufacturing cost of the multilayer interconnection board obtained.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1]It is a fragmentary sectional view showing one example of the multilayer interconnection board of this invention.
[Drawing 2]It is an explanatory view explaining the effect of the land shown in drawing 1.
[Drawing 3]It is a fragmentary sectional view showing other examples of this invention.
[Drawing 4]It is a fragmentary sectional view showing other examples of this invention.
[Drawing 5]It is process drawing explaining the manufacturing process of the multilayer interconnection board of drawing 1.
[Drawing 6]It is process drawing explaining the manufacturing process of the multilayer interconnection board of drawing 3.
[Drawing 7]It is process drawing explaining the manufacturing process of the multilayer interconnection board of drawing 4.
[Drawing 8]It is process drawing explaining the improved method of the manufacturing method of the multilayer interconnection board shown in drawing 7.
[Drawing 9]It is a fragmentary sectional view showing the conventional multilayer interconnection board.
[Drawing 10]It is process drawing explaining the manufacturing process of the multilayer interconnection board of drawing 9.
[Drawing 11]It is process drawing explaining the manufacturing process of the conventional multilayer interconnection board simplified rather than the manufacturing process of drawing 10.
[Description of Notations]
10 Insulating substrate
12 and 14 Insulating resin layer
16 The conductive pattern formed on the insulating substrate 10
17 Conductive pattern
18 The land formed on the insulating substrate 10
20 Beer part
22 Adhesion barrier layer
24 and 25 Metal layer
26 Barrier layer
28 Land

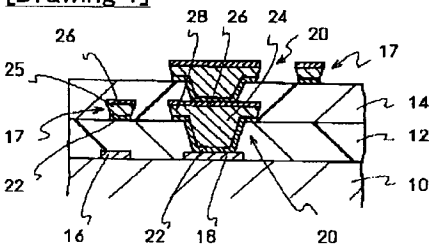
[Translation done.]

* NOTICES *

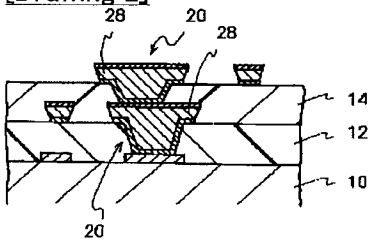
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

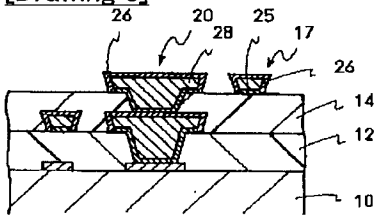
[Drawing 1]



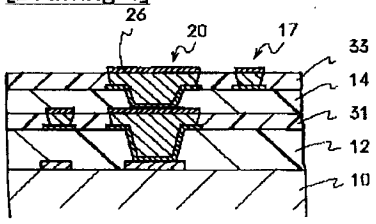
[Drawing 2]



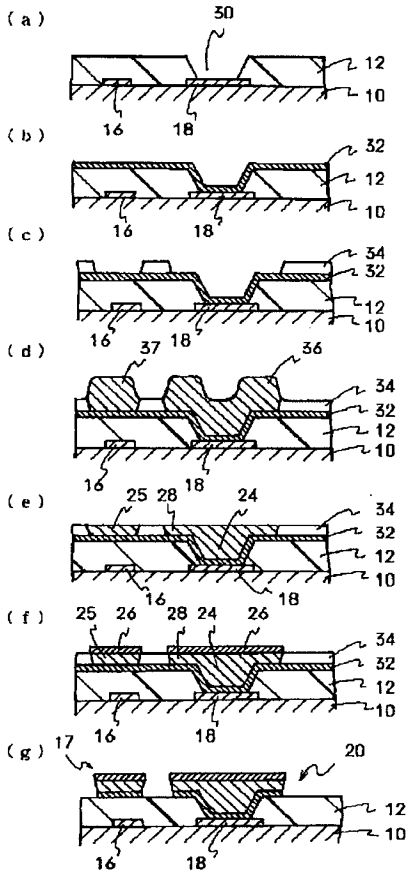
[Drawing 3]



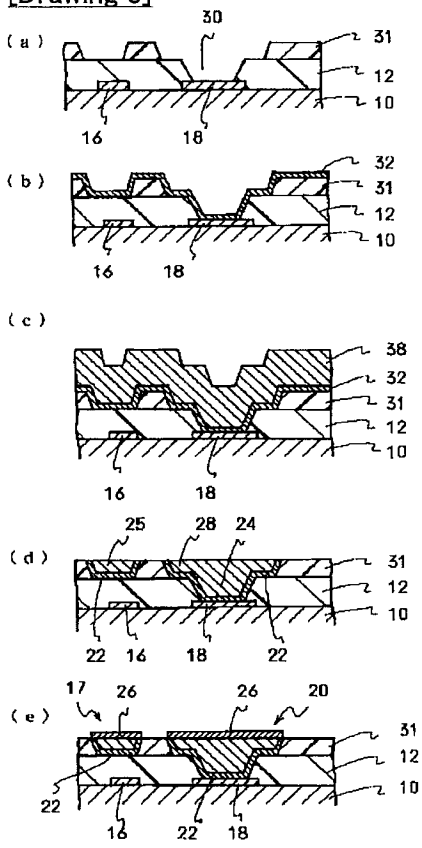
[Drawing 4]



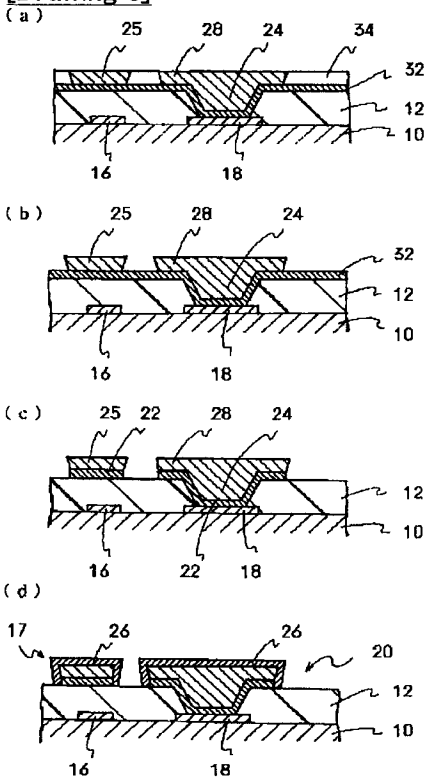
[Drawing 5]


(a)
30
12
10
16
18
(b)
32
12
10
16
18
(c)
34
32
12
10
16
18
(d)
37
36
34
32
12
10
16
18
(e)
25
28
24
34
32
12
10
16
18
(f)
25
26
28
24
26
34
32
12
10
16
18
(g)
17
20
12
10
16
18

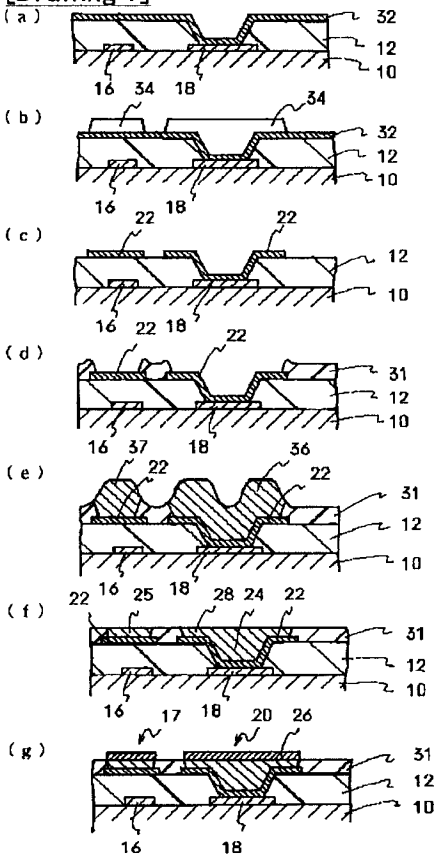
[Drawing 8]


(a)
30
31
12
10
16
18
(b)
32
31
12
10
16
18
(c)
38
32
31
12
10
16
18
(d)
25
28
24
31
12
10
22
16
18
22
(e)
17
26
26
20
31
12
10
22
16
22
18

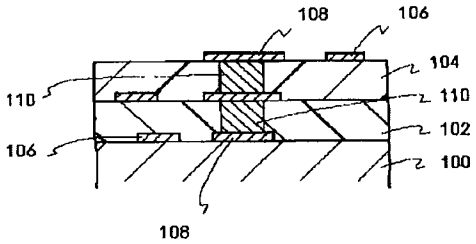
[Drawing 6]



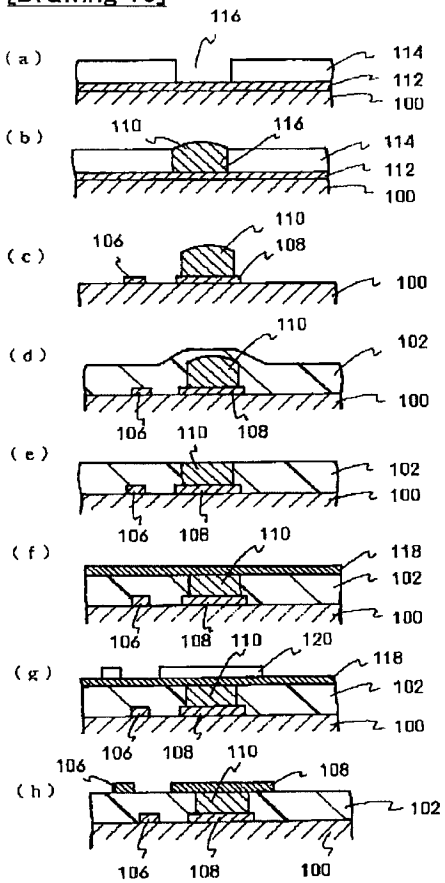
[Drawing 7]



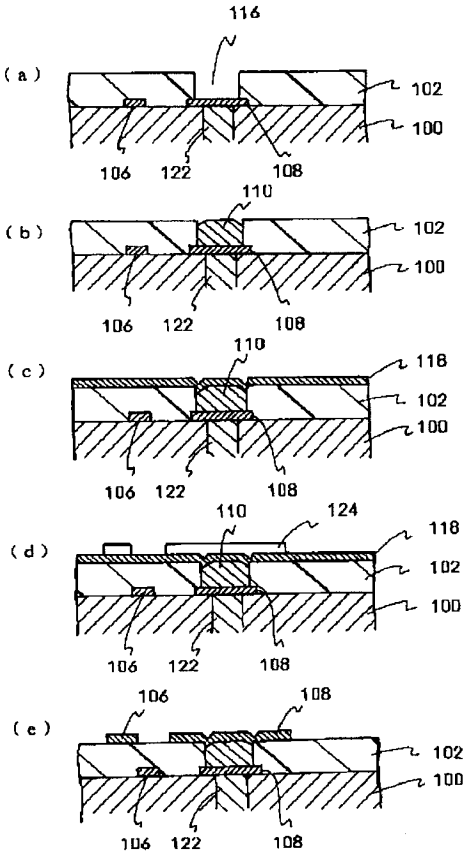
[Drawing 9]



[Drawing 10]



[Drawing 11]



[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CORRECTION OR AMENDMENT

[Kind of official gazette]Printing of amendment by the regulation of 2 of Article 17 of Patent Law
[Section classification] The 2nd classification of the part VII gate
[Publication date]August 3, Heisei 13 (2001.8.3)

[Publication No.]JP,7-79078,A
[Date of Publication]March 20 (1995.3.20), Heisei 7
[Annual volume number] Publication of patent applications 7-791
[Application number]Japanese Patent Application No. 5-223416
[The 7th edition of International Patent Classification]

H05K 3/46
[FI]

H05K 3/46 N
[Written amendment]
[Filing date]August 30 (2000.8.30), Heisei 12
[The amendment 1]
[Document to be Amended]Specification
[Item(s) to be Amended]Claim
[Method of Amendment]Change
[Proposed Amendment]
[Claim(s)]
[Claim 1]A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer, In a multilayer interconnection board possessing a beer part which comprises metal which pierced through said insulating resin layer and was formed so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected,
A metal layer which plating restoration was carried out and was formed in a breakthrough which this beer part pierces through an insulating resin layer of a next layer laminated on an insulating substrate or the surface of an insulating resin layer in which said conductive pattern was formed, and a land of said conductive pattern exposes, A land which extended from said metal layer and was formed on the surface of an insulating resin layer is comprised,
A multilayer interconnection board, wherein an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and a beer part and a beer part in a contact surface of a beer part which contacts said insulating resin layer at least is formed.
[Claim 2]The multilayer interconnection board according to claim 1 covered with a barrier layer which plans nonproliferation to an insulating resin layer of metal in which all the surfaces of a land which forms a beer part form said beer part.
[Claim 3]The multilayer interconnection board according to claim 1 by which a level difference prevention layer which comprises insulating resin is formed between a conductive pattern and a conductive pattern which were formed on the surface of [same] an insulating resin layer, and between a conductive pattern and a land which constitutes a beer part.
[Claim 4]A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer,

When a multilayer interconnection board possessing a beer part which comprises metal which pierced through said insulating resin layer and was formed is manufactured so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected,
A land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer to an insulating resin layer of a wrap next layer. After drilling a breakthrough which said land is exposed and forms the bottom, an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part and a beer part in all the surfaces of said insulating resin layer containing the bottom and a wall surface of said breakthrough is formed,
Subsequently, it is a portion which forms a conductive pattern and a beer part which were produced by patterning after a regist layer of a predetermined height formed on said adhesion barrier layer, and a metal layer of prescribed thickness is made to form in an exposed portion of an adhesion barrier layer with plating.
Then, a manufacturing method of a multilayer interconnection board removing an exposed portion of said adhesion barrier layer exposed by removing said regist layer, and forming a conductive pattern and a beer part after performing and carrying out flattening of the grinding treatment to said metal layer.
[Claim 5]To metallic layer faces which performed and carried out flattening of the grinding treatment to a metal layer of prescribed thickness formed with plating. A manufacturing method of the multilayer interconnection board according to claim 4 which removes an exposed portion of an adhesion barrier layer exposed by removing a regist layer after forming a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said metal layer, and forms a conductive pattern and a beer part.
[Claim 6]After performing and carrying out flattening of the grinding treatment to a metal layer of prescribed thickness formed with plating, A manufacturing method of the multilayer interconnection board according to claim 4 which forms a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part in the surface of a conductive pattern and a beer part which removed an exposed portion of an adhesion barrier layer which removed a regist layer and was exposed, and were formed.
[Claim 7]A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer,
When a multilayer interconnection board possessing a beer part which comprises metal which pierced through said insulating resin layer and was formed is manufactured so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected,
A land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer to an insulating resin layer of a wrap next layer. After drilling a breakthrough which said land is exposed and forms the bottom, an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and said beer part and a beer part in all the surfaces of said insulating resin layer containing the bottom and a wall surface of said breakthrough is formed,
Subsequently, so that an adhesion barrier layer of a portion in which said conductive pattern and a beer part are formed may remain, After patterning after said adhesion barrier layer, a level difference prevention layer of a predetermined height which comprises insulating resin is made to form so that an adhesion barrier layer of a portion which forms said conductive pattern, and an adhesion barrier layer of a portion which forms a beer part may be exposed.
Then, a manufacturing method of a multilayer interconnection board forming a metal layer of prescribed thickness in a portion which forms a conductive pattern and a beer part which an adhesion barrier layer exposed, performing and carrying out flattening of the grinding treatment to it with plating at said metal layer, and forming a conductive pattern and a beer part.
[Claim 8]A manufacturing method of the multilayer interconnection board according to claim 7 which forms a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part in the surface of a conductive pattern and a beer part which performed and carried out flattening of the grinding treatment.
[Claim 9]A conductive pattern which an insulating resin layer of two or more layers was laminated on an insulating substrate, and was formed in the said insulating substrate and surface side of an insulating resin layer,
When a multilayer interconnection board possessing a beer part which comprises metal which pierced through said insulating resin layer and was formed is manufactured so that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected,
A land of a conductive pattern formed in this insulating substrate or the surface of an insulating resin layer to an insulating resin layer of a wrap next layer. After drilling a breakthrough which said land is exposed and forms the bottom, a level difference prevention layer of a predetermined height which comprises insulating resin is formed

so that a portion which forms said conductive pattern, and a portion which forms a beer part may be exposed, Subsequently, all the surfaces of said insulating resin layer and a level difference prevention layer containing the bottom and a wall surface of said breakthrough are covered, After forming an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with said insulating resin layer and a beer part, and a beer part, a metal layer of prescribed thickness is made to form with plating on said adhesion barrier layer.
Then, a manufacturing method of a multilayer interconnection board performing and carrying out flattening of the grinding treatment to said metal layer, and forming a conductive pattern and a beer part.
[Claim 10]A manufacturing method of the multilayer interconnection board according to claim 9 which forms a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said conductive pattern and a beer part in the surface of a conductive pattern and a beer part which performed and carried out flattening of the grinding treatment.
[The amendment 2]
[Document to be Amended]Specification
[Item(s) to be Amended]0006
[Method of Amendment]Change
[Proposed Amendment]
[0006]
[Means for Solving the Problem]As a result of repeating examination that this invention person should attain said purpose, when filling up a breakthrough for beer parts with metal and forming a beer part in it with electrolysis plating, by forming a beer part and a conductive pattern simultaneously, Aim at improvement in adhesion with an insulating resin layer and a beer part to the rear-face side of that shortening and simplification of a process are attained, and a beer part in contact with an insulating resin layer, and. By forming an adhesion barrier layer which can plan nonproliferation to an insulating resin layer of metal which forms a beer part, it found out that exfoliation with a beer part and an insulating resin layer, a fall of insulation performance of an insulating resin layer, etc. could be canceled, and this invention was reached. Namely, a conductive pattern in which an insulating resin layer of two or more layers was laminated on an insulating substrate, and this invention was formed in the said insulating substrate and surface side of an insulating resin layer, So that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected, In a multilayer interconnection board possessing a beer part which comprises metal which pierced through said insulating resin layer and was formed, A metal layer which plating restoration was carried out and was formed in a breakthrough which this beer part pierces through an insulating resin layer of a next layer laminated on an insulating substrate or the surface of an insulating resin layer in which said conductive pattern was formed, and a land of said conductive pattern exposes, A land which extended from said metal layer and was formed on the surface of an insulating resin layer is comprised, It is in a multilayer interconnection board, wherein an adhesion barrier layer which plans nonproliferation to an insulating resin layer of metal which forms improvement in adhesion with an insulating resin layer and a beer part and a beer part in a contact surface of a beer part which contacts said insulating resin layer at least is formed. In a multilayer interconnection board of this composition, when all the surfaces of a land which forms a beer part cover by a barrier layer which plans nonproliferation to an insulating resin layer of metal which forms said beer part, diffusion of metal from the surface of a land to an insulating resin layer can be prevented.
[Amendment 3]
[Document to be Amended]Specification
[Item(s) to be Amended]0007
[Method of Amendment]Change
[Proposed Amendment]
[0007]The conductive pattern in which the insulating resin layer of two or more layers was laminated on the insulating substrate, and this invention was formed in the said insulating substrate and surface side of an insulating resin layer, So that the predetermined conductive patterns formed in the surface side of a mutually different insulating resin layer may be connected, When manufacturing the multilayer interconnection board possessing the beer part which comprises the metal which pierced through said insulating resin layer and was formed, The land of the conductive pattern formed in this insulating substrate or the surface of an insulating resin layer to the insulating resin layer of a wrap next layer. After drilling the breakthrough which said land is exposed and forms the bottom, on all the surfaces of said insulating resin layer containing the bottom and the wall surface of said breakthrough. Form the adhesion barrier layer which plans nonproliferation to the insulating

resin layer of the metal which forms the improvement in adhesion with an insulating resin layer and said beer part, and a beer part, and it ranks second, . Were obtained by patterning after the regist layer of the predetermined height formed on said adhesion barrier layer. . Were a portion which forms a conductive pattern and a beer part, and made the metal layer of prescribed thickness form with plating, and after performing and carrying out flattening of the grinding treatment to said metal layer after that, exposed to the exposed portion of an adhesion barrier layer by removing said regist layer. It is also a manufacturing method of the multilayer interconnection board removing the exposed portion of said adhesion barrier layer, and forming a conductive pattern and a beer part.

[Amendment 4]

[Document to be Amended]Specification

[Item(s) to be Amended]0008

[Method of Amendment]Change

[Proposed Amendment]

[0008]After making the metal layer of prescribed thickness form with plating in the manufacturing method of the multilayer interconnection board of this composition, Perform and carry out flattening of the grinding treatment to said metal layer, and after that the exposed portion of the adhesion barrier layer which removed said regist layer and was exposed on the surface of the conductive pattern and beer part which were removed and formed. By forming the barrier layer which plans nonproliferation to the insulating resin layer of the metal which forms said conductive pattern and a beer part, the exposed surface of a conductive pattern and a beer part can be covered by a barrier layer. So that the adhesion barrier layer of a portion in which a conductive pattern and a beer part are formed may remain, After patterning after said adhesion barrier layer, between the adhesion barrier layer of the portion which forms said conductive pattern, and the adhesion barrier layer of the portion which forms a beer part, Into the portion which is made to form the level difference prevention layer of the predetermined height which comprises insulating resin, and an adhesion barrier layer is exposed after that, and forms a conductive pattern and a beer part. On the surface of the conductive pattern and beer part which were formed by performing and carrying out flattening of the grinding treatment to said metal layer after making the metal layer of prescribed thickness form with plating. By forming the barrier layer which plans nonproliferation to the insulating resin layer of the metal which forms said conductive pattern and a beer part, even if a land and a conductive pattern are thick, the surface smoothness of a multilayer interconnection board is securable.

[Amendment 5]

[Document to be Amended]Specification

[Item(s) to be Amended]0010

[Method of Amendment]Change

[Proposed Amendment]

[0010]

[Function]According to this invention, by the adhesion barrier layer which plans nonproliferation to the insulating resin layer of the metal which forms the improvement in adhesion with the insulating resin layer and metal layer which were formed in the rear-face side of the beer part in contact with an insulating resin layer, and a metal layer. Exfoliation with a beer part and an insulating resin layer and the insulating fall of an insulating resin layer are cancelable. The land of the conductive pattern in which the breakthrough for beer parts was formed in the rear-face side of an insulating resin layer can form the adhesion barrier layer of uniform thickness in the breakthrough exposed to the bottom easily by weld slag etc.When filling up a breakthrough with metal and forming a beer part in it with plating, a conductive pattern can be formed simultaneously and a process can be remarkably simplified as compared with the conventional manufacturing method the process of forming a beer part, and whose process of forming a conductive pattern are separated processes.

[Translation done.]

(19)日本国特許庁（ＪＰ）　(12)公開特許公報（A）　(11)特許出願公開番号

特開平7－79078

(43)公開日　平成７年(1995)３月20日

(51)Int.Cl.[6]	識別記号	庁内整理番号	ＦＩ	技術表示箇所
Ｈ０５Ｋ　3/46		Ｎ　6921－4Ｅ		

審査請求　未請求　請求項の数７　ＯＬ　（全 10 頁）

(21)出願番号　特願平5－223416

(22)出願日　平成５年(1993)９月８日

(71)出願人　000190688
新光電気工業株式会社
長野県長野市大字栗田字舎利田711番地

(72)発明者　坂口　登
長野県長野市大字栗田字舎利田711番地
新光電気工業株式会社内

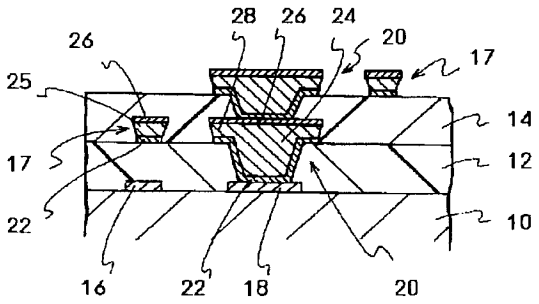
(74)代理人　弁理士　綿貫　隆夫　（外１名）

(54)【発明の名称】　多層配線基板及びその製造方法

(57)【要約】

【目的】　金属から成るビア部と絶縁性樹脂層との剥離や絶縁性樹脂層の絶縁性能の低下等を解消し得る多層配線基板を提供する。

【構成】　基板内に絶縁性樹脂層１２、１４を介して多層に形成された導体パターン１６、１７と、導体パターン同士を連結するように、絶縁性樹脂層１２、１４を貫いて形成された金属から成るビア部２０とを具備する多層配線基板において、該ビア部２０が、導体パターン１６が形成された絶縁性基板１０の表面上に積層された次層の絶縁性樹脂層１２を貫き、導体パターン１６のランド部１８が露出する底面側ほど小径となるように、絶縁性樹脂層１２に穿設されたテーパー状貫通孔に、めっき充填されて形成された金属層２４と、金属層２４から延出されて絶縁性樹脂層１２、１４の表面上に形成されたランド部２８とから成り、且つビア部２０の絶縁性樹脂層１２との接触面に、絶縁性樹脂層１２とビア部２０との密着性向上及びビア部２０を形成する金属の絶縁性樹脂層１２への拡散防止を図る密着バリア層２２が形成されていることを特徴とする。



1

【特許請求の範囲】

【請求項１】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板において、

該ビア部が、前記導体パターンが形成された絶縁性基板又は絶縁性樹脂層の表面上に積層された次層の絶縁性樹脂層を貫き、前記導体パターンのランド部が露出する底面側ほど小径となるテーパー状貫通孔に、めっき充填されて形成された金属層と、前記金属層から延出されて絶縁性樹脂層の表面上に形成されたランド部とから成り、少なくとも前記絶縁性樹脂層と接触するビア部の接触面に、絶縁性樹脂層とビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層が形成されていることを特徴とする多層配線基板。

【請求項２】　ビア部を形成するランド部の全表面が、前記ビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層によって覆われている請求項１記載の多層配線基板。

【請求項３】　絶縁性樹脂層の同一表面に形成された導体パターンとビア部を構成するランド部との間に、絶縁性樹脂から成る段差防止層が形成されている請求項１記載の多層配線基板。

【請求項４】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、

該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成するように、底面側ほど小径となるテーパー状貫通孔を穿設した後、前記テーパー状貫通孔の底面及び壁面を含む前記絶縁性樹脂層の全表面に、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層を形成し、

次いで、前記密着バリア層上に形成された所定高さのレジスト層にパターニングして得られた、導体パターン及びビア部を形成する部分で且つ密着バリア層の露出部分に、めっきにより前記レジスト層の高さ以上の金属層を形成せしめ、

その後、前記金属層に研磨処理を施して平坦化した金属層面に、前記金属層を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成した後、前記レジスト層

2

を除去することによって露出した、前記密着バリア層の露出部分を除去して導体パターン及びビア部を形成することを特徴とする多層配線基板の製造方法。

【請求項５】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、

該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成するように、底面側ほど小径となるテーパー状貫通孔を穿設した後、前記テーパー状貫通孔の底面及び壁面を含む前記絶縁性樹脂層の全表面に、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層を形成し、

次いで、前記密着バリア層上に形成された所定高さのレジスト層にパターニングして得られた、導体パターン及びビア部を形成する部分で且つ密着バリア層の露出部分に、めっきにより前記レジスト層の高さ以上の金属層を形成せしめ、

その後、前記金属層に研磨処理を施して平坦化した後、前記レジスト層を除去して露出した前記密着バリア層の露出部分を除去して形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成することを特徴とする多層配線基板の製造方法。

【請求項６】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、

該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成するように、底面側ほど小径となるテーパー状貫通孔を穿設した後、前記テーパー状貫通孔の底面及び壁面を含む前記絶縁性樹脂層の全表面に、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層を形成し、

次いで、前記導体パターン及びビア部が形成される部分の密着バリア層が残留するように、前記密着バリア層にパターニングを施した後、前記導体パターンを形成する部分の密着バリア層とビア部を形成する部分の密着バリア層との間に、絶縁性樹脂から成る所定高さの段差防止層を形成せしめ、

その後、密着バリア層が露出して導体パターン及びビア部を形成する部分に、めっきによって形成した前記段差防止層の高さ以上の金属層に、研磨処理を施して平坦化することにより形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成することを特徴とする多層配線基板の製造方法。

【請求項７】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、

該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成するように、底面側ほど小径となるテーパー状貫通孔を穿設した後、前記導体パターンを形成する部分とビア部を形成する部分との間に、絶縁性樹脂から成る所定高さの段差防止層を形成し、

次いで、前記テーパー状貫通孔の底面及び壁面を含む前記絶縁性樹脂層と段差防止層との全表面に亘って形成された、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層上に、めっきによって所定厚さの金属層を形成せしめ、

その後、前記金属層に研磨処理を施し平坦化することによって露出した段差防止層を介して形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成することを特徴とする多層配線基板の製造方法。

【発明の詳細な説明】

【０００１】

【産業上の利用分野】本発明は多層配線基板及びその製造方法に関し、更に詳細には絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板及びその製造方法に関する。

【０００２】

【従来の技術】半導体装置等の電子装置には、装置が高集積化され複雑化していることに伴って、信号を伝送する導体パターンの高密度化が要求されている。しかし、絶縁性基板の表面側に工業的に形成し得る導体パターンの密度は、技術の進歩で年々高密度化しているものの限界がある。このため、更に一層の高密度化した導体パターンを基板に形成すべく、導体パターンを多層化した多層配線基板が採用されている。

かかる多層配線基板においては、図９に示す如く、導体パターン１０６・・及び導体パターンの端部にランド部（以下、単にランド部と称することがある）１０８が形成されたセラミック製の絶縁性基板１００上に、ポリイミド等の樹脂から成る絶縁性樹脂層１０２、１０４が積層され、絶縁性樹脂層１０２、１０４の各表面側には導体パターン１０６・・及びランド部１０８が形成されている。これら導体パターン１０６・・のうち、異なる絶縁性樹脂層の表面側に形成された導体パターン１０６との連結は、ランド部１０８上に立設され且つ絶縁性樹脂層を貫いて略円筒状に形成された金属層１１０から成るビア部によってなされる。

【０００３】この図９に示す多層配線基板は、従来、図１０に示す方法で製造される。つまり、セラミック製の絶縁性基板１００の全表面に、メタライズ層１１２をスパッタ等によって形成した後、メタライズ層１１２上に所定厚さで塗布したレジスト層１１４に穿設した、メタライズ層１１２が露出する略円筒状のビア部用貫通孔１１６に、電解めっきによってレジスト層１１４の高さ以上に積層された銅金属から成る金属層１１０を形成する〔図１０（ａ）（ｂ）〕。更に、レジスト層１１４を除去してからメタライズ層１１２にパターニングを施し、導体パターン１０６及びランド部１０８を形成した後〔図１０（ｃ）〕、ポリイミド等の樹脂を塗布して形成した金属層１１０を覆う所定厚さの絶縁性樹脂層１０２の表面を研磨処理して金属層１１０の上端面を露出すると共に、金属層１１０及び絶縁性樹脂層１０２を平坦化する〔図１０（ｄ）（ｅ）〕。次いで、金属層１１０の露出面及び絶縁性樹脂層１０２の平坦面の全面にスパッタ等によって形成したメタライズ層１１８に、レジスト層１２０を形成してパターニングを施し、上層の導体パターン１０６・・及びランド部１０８を形成する〔図１０（ｆ）（ｇ）（ｈ）〕。以下、図１０（ｈ）の絶縁性樹脂層１０２上に対し図１０（ａ）からの工程を順次施すことによって、絶縁性樹脂層が絶縁性基板１００上に複数層積層された多層配線基板を製造できる。

【０００４】また、図１１に示す如く、絶縁性基板１００に予めビア部１２２が形成されている場合には、図１０に示す工程よりも省略された工程で多層配線基板を製造することができる。この工程では、先ず、絶縁性基板１００上に全面に亘って形成したメタライズ層にパターニングを施して形成した導体パターン１０６・・及びランド部１０８を覆うように、ポリイミド等の樹脂から成る所定厚さの絶縁性樹脂層１０２に、ランド部１０８の表面が底面に露出するビア部用貫通孔１１６を穿設する〔図１１（ａ）〕。かかるビア部用貫通孔１１６に、ビア部１２２を通じて給電しつつ電解めっきによって金属層１１０を形成する〔図１１（ｂ）〕。この金属層１１

０の高さは、絶縁性樹脂層１０２の表面から先端が突出しないようにする。次いで、金属層１１０の表面を含む絶縁性樹脂層１０２の全面にスパッタ等によって形成したメタライズ層１１８に、レジスト層１２４を形成してパターニングを施し導体パターン１０６及びランド部１０８を形成する〔図１１（ｃ）（ｄ）（ｅ）〕。以下、図１１（ｅ）の絶縁性樹脂層１０２上に対し図１１（ａ）からの工程を順次施すことによって、絶縁性樹脂層が絶縁性基板１００上に複数層積層された多層配線基板を製造できる。

【０００５】

【発明が解決しようとする課題】かかる図１０及び図１１に示す多層配線基板の製造方法によれば、複雑な導体パターンが多層に形成された多層配線基板を製造することができる。しかしながら、図１０に示す多層配線基板の製造方法は、工程が長く複雑であるため、工程の短縮化や簡略化等が要請されている。一方、図１１に示す多層配線基板の製造方法は、図１０に示す製造方法に比較して工程が簡略化されるが、絶縁性基板に予めビア部が形成されていることが必要である。しかも、図１１に示す製造方法によって得られた多層配線基板には、ビア部と絶縁性樹脂層との境界近傍に多少の段差部が形成され易いため、かかる段差部上に形成された導体パターンやランド部に断線が発生する懸念も存在する。また、ビア部の金属層１１０と絶縁性樹脂層との密着性が劣るため、ビア部と絶縁性樹脂層との剥離、或いは銅等の金属が絶縁性樹脂層に拡散して絶縁性樹脂層の絶縁性能の低下を惹起するおそれもある。そこで、本発明の目的は、金属から成るビア部と絶縁性樹脂層との剥離や絶縁性樹脂層の絶縁性能の低下等を解消し得る多層配線基板の提供、及び多層配線基板の製造工程を簡略化することのできる多層配線基板の製造方法を提供することにある。

【０００６】

【課題を解決するための手段】本発明者は、前記目的を達成すべく検討を重ねた結果、ビア部用貫通孔に電解めっきによって金属を充填してビア部を形成する際に、ビア部と導体パターンとを同時に形成することによって、工程の短縮化や簡略化が可能となること、及び絶縁性樹脂層と接触するビア部の裏面側に、絶縁性樹脂層とビア部との密着性向上を図ると共に、ビア部を形成する金属の絶縁性樹脂層への拡散防止を図り得る密着バリア層を形成することによって、ビア部と絶縁性樹脂層との剥離や絶縁性樹脂層の絶縁性能の低下等を解消し得ることを見出し、本発明に到達した。すなわち、本発明は、絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板において、該ビア部

が、前記導体パターンが形成された絶縁性基板又は絶縁性樹脂層の表面上に積層された次層の絶縁性樹脂層を貫き、前記導体パターンのランド部が露出する底面側ほど小径となるテーパー状貫通孔に、めっき充填されて形成された金属層と、前記金属層から延出されて絶縁性樹脂層の表面上に形成されたランド部とから成り、少なくとも前記絶縁性樹脂層と接触するビア部の接触面に、絶縁性樹脂層とビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層が形成されていることを特徴とする多層配線基板にある。

かかる構成の多層配線基板において、ビア部を形成するランド部の全表面が、前記ビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層で覆うことによって、ランド部の表面から絶縁性樹脂層への金属の拡散を防止できる。

【０００７】また、本発明は、絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成するように、底面側ほど小径となるテーパー状貫通孔を穿設した後、前記テーパー状貫通孔の底面及び壁面を含む前記絶縁性樹脂層の全表面に、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層を形成し、次いで、前記密着バリア層上に形成された所定高さのレジスト層にパターニングして得られた、導体パターン及びビア部を形成する部分で且つ密着バリア層の露出部分に、めっきにより前記レジスト層の高さ以上の金属層を形成せしめ、その後、前記金属層に研磨処理を施して平坦化した金属層面に、前記金属層を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成した後、前記レジスト層を除去することによって露出した、前記密着バリア層の露出部分を除去して導体パターン及びビア部を形成することを特徴とする多層配線基板の製造方法でもある。

【０００８】かかる構成の多層配線基板の製造方法において、めっきによりレジスト層の高さ以上の金属層を形成せしめた後、前記金属層に研磨処理を施して平坦化し、その後、前記レジスト層を除去して露出した密着バリア層の露出部分を除去して形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成することによって、導体パターン及びビア部の露出表面をバリア層で覆うことができる。また、導体パターン及びビア部が形成される部分の密着バリア層が残留す

るように、前記密着バリア層にパターニングを施した後、前記導体パターンを形成する部分の密着バリア層とビア部を形成する部分の密着バリア層との間に、絶縁性樹脂から成る所定高さの段差防止層を形成せしめ、その後、密着バリア層が露出して導体パターン及びビア部を形成する部分に、めっきによって前記段差防止層の高さ以上の金属層を形成せしめた後、前記金属層に研磨処理を施して平坦化することにより形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成することによって、ランド部及び導体パターンが厚くても多層配線基板の平坦性を確保できる。

【０００９】更に、絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成するように、底面側ほど小径となるテーパー状貫通孔を穿設した後、前記導体パターンを形成する部分とビア部を形成する部分との間に、絶縁性樹脂から成る所定高さの段差防止層を形成し、次いで、前記テーパー状貫通孔の底面及び壁面を含む前記絶縁性樹脂層と段差防止層との全表面に亘って形成された、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層上に、めっきによって所定厚さの金属層を形成せしめ、その後、前記金属層に研磨処理を施し平坦化することによって露出した段差防止層を介して形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成することによって、段差防止層の側壁に密着バリア層を形成でき、且つ容易に多層配線基板を製造することができる。

【００１０】

【作用】本発明によれば、絶縁性樹脂層と接触するビア部の裏面側に形成された、絶縁性樹脂層と金属層との密着性向上及び金属層を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層によって、ビア部と絶縁性樹脂層との剥離及び絶縁性樹脂層の絶縁性低下を解消することができる。また、ビア部用貫通孔が絶縁性樹脂層の裏面側に形成された導体パターンのランド部が露出する底面側ほど小径となるテーパー状貫通孔であるため、均一厚さの密着バリア層をスパッタ等によって容易に形成することができる。更に、テーパー状貫通孔にめっきによって金属を充填してビア部を形成する際に、同時に導体パターンを形成することができ、ビア部を形成する工程と導体パターンを形成する工程とが別工程である従来の製造方法に比較して、工程を著しく簡略化することができる。

【００１１】

【実施例】本発明を図面によって更に詳細に説明する。図１は、本発明の一実施例を示す部分断面図であって、窒化アルミからなるセラミック製の絶縁性基板１０の上面に導体パターン１６及び導体パターンの端部にランド部１８が形成されている。これら導体パターン１６及びランド部１８は、絶縁性基板面からチタン（Ｔｉ）薄膜層、モリブデン（Ｍｏ）薄膜層、及びニッケル（Ｎｉ）薄膜層が順次積層されている。この導体パターン１６及びランド部１８を形成するチタン（Ｔｉ）薄膜層は、窒化アルミからなるセラミック製の絶縁性基板１０と信号を伝送するモリブデン（Ｍｏ）薄膜層との密着性の向上を、ニッケル（Ｎｉ）薄膜層は、モリブデン（Ｍｏ）薄膜層の絶縁性樹脂層への拡散防止を各々図るためのものである。かかる導体パターン１６は所定厚さのポリイミド樹脂から成る絶縁性樹脂層１２によって覆われているが、ランド部１８は絶縁性樹脂層１２を貫いて形成されたビア部２０の底面と接続されている。

【００１２】ビア部２０は、銅金属から成り且つランド部１８側ほど小径となるテーパー状であって、絶縁性樹脂層１２に形成されたテーパー状貫通孔にめっき充填されて形成された金属層２４と、金属層２４から延出されて絶縁性樹脂層１２の表面上に、テーパー状貫通孔の開口部よりも広面積に形成されたランド部２８とから成る。かかる金属層２４とランド部２８との絶縁性樹脂層１２に接触する部分には、絶縁性樹脂層１２と金属層２４との密着性向上及び銅金属の絶縁性樹脂層１２への拡散防止を図る密着バリア層２２が形成されている。密着バリア層２２は、テーパー状貫通孔の壁面側からクロム（Ｃｒ）薄膜層及び銅（Ｃｕ）薄膜層が順次積層されて形成されているものである。これら薄膜層のうち、クロム（Ｃｒ）薄膜層は絶縁性樹脂層１２との密着性向上と銅金属の拡散防止を、及び銅（Ｃｕ）薄膜層は密着バリア層２２の電気抵抗値の低下を各々図るためである。この密着バリア層２２を構成する銅（Ｃｕ）薄膜層の層厚は約０．２μｍ程度でよい。また、絶縁性樹脂層１２の上面に形成された、ランド部２８と同一厚さの導体パターン１７及びランド部２８の各上面には、銅金属の絶縁性樹脂層への拡散防止のため、バリア層２６としてニッケル（Ｎｉ）薄膜層が形成されている。尚、本実施例では、導体パターン１７を形成する銅層２５の下面側にも、密着バリア層２２が形成されている。

【００１３】図１に記載する多層配線基板は、絶縁性樹脂層１２上に絶縁性樹脂層１４が積層され、下層の絶縁性樹脂層１２に形成されたビア部２０のランド部２８と上層の絶縁性樹脂層１４に形成されたビア部２０とが接続され、且つ絶縁性樹脂層１４の上面に導体パターン１７が形成されている。尚、上層の絶縁性樹脂層１４に形成されたビア部２０と導体パターン１７とは、下層の絶縁性樹脂層１２に形成されたビア部２０と導体パターン１７と同一構造であるため、詳細説明を省略する。ところで、通常、多層配線基板においては、図９に示す如く、ビア部を形成する金属層１１０の下端面積よりもランド部１０８の上端面積を大とする。金属層１１０とラ

ンド部１０８との中心位置が多少ズレても両者の接続を確保するためである。この点、本実施例において、ビア部２０を形成する金属層２４の部分が、テーパー状に形成されているため、金属層２４の上端面積を従来のビア部を形成する金属層１１０の上端面積と等しくしても、金属層２４の下端面積を小面積にできる。このため、図２に示す様に、ランド部２８の中心と接続するビア部２０の中心とが多少ズレても確実に両者の接続を確保できる。

【００１４】また、図１～図２に示す多層配線基板においては、絶縁性樹脂層１２、１４の表面から突出するランド部２８及び導体パターン１７の側面は、銅金属が露出している。このため、ランド部２８及び導体パターン１７が厚い場合には、銅金属の絶縁性樹脂層への拡散防止のため、図３に示す様に、ニッケル（Ｎｉ）薄膜層から成るバリア層２６を側面側にまで延長することが好ましい。更に、ランド部２８及び導体パターン１７が厚い場合には、ランド部２８と導体パターン１７との間に段差部が形成され易いため、図４に示す様に、ランド部２８と導体パターン１７との間に絶縁性樹脂から成る段差防止層３１、３３を形成することによって、多層配線基板の平坦性を保持できる。

【００１５】この様な図１～４に示す多層配線基板のうち、図１に示す多層配線基板は、図５に示す製造方法によって製造することができる。図１において、先ず、窒化アルミから成るセラミック製の絶縁性基板１０上に形成した導体パターン１６及びランド部１８を覆う所定厚さのポリイミド樹脂から成る絶縁性樹脂層１２を形成し、ランド部１８が露出して底面を形成するテーパー状貫通孔３０を絶縁性樹脂層１２に穿設する〔図５（ａ）〕。このテーパー状貫通孔３０は、底面側ほど小径となるテーパー状であって、等方性エッチングによって形成できる。尚、導体パターン１６及びランド部１８は、絶縁性基板１０の全面に亘ってスパッタによって形成したチタン（Ｔｉ）薄膜層、モリブデン（Ｍｏ）薄膜層、及びニッケル（Ｎｉ）薄膜層から成るメタライズ層に、パターニングして形成されたものである。かかるテーパー状貫通孔３０の壁面及びランド部１８が露出した底面を含む絶縁性樹脂層１２の全面に亘って、クロム（Ｃｒ）薄膜層及び銅（Ｃｕ）薄膜層から成るメタライズ層３２をスパッタによって形成し、導体パターン及びビア部を形成する部分のメタライズ層３２が露出するように、メタライズ層３２上に所定高さのレジスト層３４を形成する〔図５（ｂ）（ｃ）〕。ここで、テーパー状貫通孔３０が略円筒状貫通孔である場合、スパッタによって貫通孔の壁面に形成するメタライズ層３２を均一厚さにし難い。

【００１６】次いで、メタライズ層３２から給電しつつ電解めっきによって、メタライズ層３２の露出部分に銅金属を積層して銅金属層３６、３７を形成する。電解めっきは、銅金属層３６、３７の最も低い部分がレジスト層３４の表面以上の高さとなるまで継続する〔図５（ｄ）〕。この銅金属層３６、３７は、研磨処理によって平坦化されると共に、厚さが調整され、導体パターン１７（図１）を形成する銅層２５及びビア部２０（図１）を形成する金属層２４とランド部２８となる〔図５（ｅ）〕。更に、図５（ｅ）に示す銅層２５及びランド部２８の表面には、銅金属の拡散防止を図るため、バリア層２６としてニッケル（Ｎｉ）薄膜層を電解めっきによって形成した後、レジスト層３４を除去してからメタライズ層３２の露出部分をエッチング等で除去することによって絶縁性樹脂層１２上に導体パターン１７と、絶縁性基板１０上に形成されたランド部１８と接続されたビア部２０とを同時に形成できる〔図５（ｆ）（ｇ）〕。尚、バリア層２６としてのニッケル（Ｎｉ）薄膜層を電解めっきによって形成できない場合には、無電解めっきによって形成してもよい。以下、図５（ｇ）の絶縁性樹脂層１２上に対し図５（ａ）からの工程を順次施すことによって、絶縁性樹脂層が絶縁性基板１０上に複数層積層された多層配線基板を製造できる。

【００１７】また、図３に示す多層配線基板を製造せんとする場合、図６に示す方法によって製造できる。この方法は、図５（ｅ）の工程まで図５に示す工程と同一工程を通過するため、図５（ｅ）に示す基板と同一基板を図６（ａ）に示した。図６（ａ）に示す基板に対し、レジスト層３４を除去して露出したメタライズ層３２をエッチング等で除去する。このため、絶縁性樹脂層１２上に導体パターン１７を形成する銅層２５と、絶縁性基板１０上に形成されたランド部１８と接続された、金属層２４及びランド部２８から成るビア部２０とが同時に形成される〔図６（ｂ）（ｃ）〕。次いで、銅層２５及びランド部２８の全表面に、バリア層２６としてのニッケル（Ｎｉ）薄膜層を無電解めっきによって形成する〔図６（ｄ）〕。以下、図６（ｄ）の絶縁性樹脂層１２上に対し、図５（ａ）から図５（ｅ）の工程、及び図６（ａ）から図６（ｄ）の工程を順次施すことによって、絶縁性樹脂層が絶縁性基板１０上に複数層積層された多層配線基板を製造できる。

【００１８】更に、図４に示す多層配線基板は、図７に示す方法によって製造することができる。この方法は、図５（ｂ）の工程まで図５に示す工程と同一工程を通過するため、図５（ｂ）に示す基板と同一基板を図７（ａ）に示した。図７（ａ）に示す基板に対し、導体パターン１７（図４）及びビア部２０（図４）を形成する部分にレジスト層３４を形成した後、メタライズ層３２の露出部分をエッチング等によって除去して密着バリア層２２、２２を形成する〔図７（ｂ）（ｃ）〕。次いで、絶縁性樹脂層１２の全表面に、所定厚さの絶縁性樹脂層を塗布した後、密着バリア層２２、２２の部分が露出するように絶縁性樹脂層を部分的に除去して段差防止

層３１を形成する〔図７（ｄ）〕。この絶縁性樹脂層の部分的除去は、所定厚さの絶縁性樹脂層を形成した後、絶縁性樹脂層上にパターニング用レジスト層を形成してパターニングし、エッチング処理を施すことによって行ってもよく、絶縁性樹脂層を感光性樹脂によって形成し、絶縁性樹脂層自身を露光・現像してパターニングを施すことによって行ってもよい。更に、密着バリア層２２、２２から給電しつつ電解めっきによって、密着バリア層２２、２２に銅金属を積層して銅金属層３６、３７を形成する。電解めっきは、銅金属層３６、３７の最も低い部分が段差防止層３１の表面以上の高さとなるまで継続する〔図７（ｅ）〕。

【００１９】この銅金属層３６、３７は、研磨処理によって平坦化されると共に、厚さが調整され、導体パターン１７（図４）を構成する銅層２５と、ビア部２０（図４）を構成する金属層２４及びランド部２８とを形成する〔図７（ｆ）〕。更に、図７（ｆ）に示す銅層２５及びランド部２８の表面には、銅金属の拡散防止を図るため、バリア層２６としてニッケル（Ｎｉ）薄膜層を電解めっきによって形成することによって、絶縁性樹脂層１２上に導体パターン１７と、絶縁性基板１０上に形成されたランド部１８に接続されたビア部２０とを同時に形成できる〔図７（ｇ）〕。尚、図７に示す方法におけるめっきは、電解めっきを施したが、給電ができない場合には、無電解めっきであってもよい。以下、図７（ｇ）の段差防止層３１上に、図５（ａ）から図５（ｂ）の工程、及び図７（ａ）から図７（ｇ）の工程を順次施すことによって、絶縁性樹脂層が絶縁性基板１０上に複数層積層された多層配線基板を製造できる。

【００２０】図７に示す多層配線基板の製造方法においては、メタライズ層３２にパターニングを施した後に、めっきによって銅金属層３６、３７を形成するため、形成予定の一の導体パターンが他の導体パターンから独立した独立パターンである場合、独立パターンを形成する部分に密着バリア層２２から給電することができず、電解めっきに代えて無電解めっきを採用しなければならない。この点、図８に示す製造方法によれば、形成予定の導体パターンが独立パターンであっても、電解めっきによって銅金属層を形成することができる。つまり、図５（ａ）に示す、窒化アルミから成るセラミック製の絶縁性基板１０上に形成した導体パターン１６を覆い、且つランド部１８が露出して底面を形成するテーパー状貫通孔３０が穿設された絶縁性樹脂層１２上に、段差防止層３１を形成する〔図８（ａ）〕。この段差防止層３１は、絶縁性樹脂層１２の全表面に、所定厚さの絶縁性樹脂層を形成した後、形成予定の導体パターン１７及びビア部２０の部分が露出するように絶縁性樹脂層を部分的に除去することによって形成する。絶縁性樹脂層の部分的除去は、所定厚さの絶縁性樹脂層を形成した後、絶縁性樹脂層上にパターニング用レジスト層を塗布してパターニングし、エッチング処理を施すことによって行ってもよく、絶縁性樹脂層を感光性樹脂によって形成し、絶縁性樹脂層自身を露光・現像してパターニングを施すことによって行ってもよい。

【００２１】次いで、テーパー状貫通孔３０の壁面及びランド部１８が露出した底面を含む絶縁性樹脂層１２と段差防止層３１との全表面に亘って、クロム（Ｃｒ）薄膜層及び銅（Ｃｕ）薄膜層から成るメタライズ層３２を形成する〔図８（ｂ）〕。更に、メタライズ層３２から給電する電解めっきによって、メタライズ層３２の全面に亘って所定厚さの銅金属層３８を形成する〔図８（ｃ）〕。このため、形成する導体パターンの一つが独立パターンであっても、常に、電解めっきによって銅金属層３８を形成できる。形成された銅金属層３８には研磨処理が施されて平坦化と厚さ調整とが行われ、露出した段差防止層３１によって導体パターンを形成する銅層２５とビア部を形成する銅層２４及びランド部２８とが分離される〔図８（ｄ）〕。その後、図８（ｄ）に示す銅層２５及びランド部２８の表面には、銅金属の拡散防止を図るため、バリア層２６としてニッケル（Ｎｉ）薄膜層を電解めっき又は無電解めっきによって形成する〔図８（ｅ）〕。以下、図８（ｅ）の段差防止層３１上に、図５（ａ）の工程、及び図８（ａ）から図８（ｅ）の工程を順次施すことによって、絶縁性樹脂層が絶縁性基板１０上に複数層積層された多層配線基板を製造できる。

【００２２】かかる図８に示す工程によって得られた多層配線基板においては、銅層２５が密着バリア層２２及びバリア層２６によって囲まれた導体パターン１７、及び銅層２４及びランド部２８が密着バリア層２２及びバリア層２６によって囲まれたビア部２０を形成することができる。このため、銅層２４、２５を形成する銅金属の拡散を充分に防止できる。また、その製造工程においても、電解めっきによって銅金属層３８を形成でき、且つメタライズ層３２のパターンニング工程を不要とすることができるため、容易に多層配線基板を製造できる。

【００２３】

【発明の効果】本発明によれば、ビア部を構成する金属層と絶縁性樹脂層との剥離防止、及び金属層を形成する金属の絶縁性樹脂層への拡散防止を図ることができ、多層配線基板の信頼性を向上することができる。また、ビア部と導体パターンとを同時に形成できるため、多層配線基板の製造工程を簡略化することができ、得られる多層配線基板の製造コストの低減を図ることも可能である。

【図面の簡単な説明】

【図１】本発明の多層配線基板の一実施例を示す部分断面図である。

【図２】図１に示すランド部の効果を説明する説明図である。

13

【図３】本発明の他の実施例を示す部分断面図である。
【図４】本発明の他の実施例を示す部分断面図である。
【図５】図１の多層配線基板の製造工程を説明する工程図である。
【図６】図３の多層配線基板の製造工程を説明する工程図である。
【図７】図４の多層配線基板の製造工程を説明する工程図である。
【図８】図７に示す多層配線基板の製造方法の改良方法を説明する工程図である。
【図９】従来の多層配線基板を示す部分断面図である。
【図１０】図９の多層配線基板の製造工程を説明する工程図である。

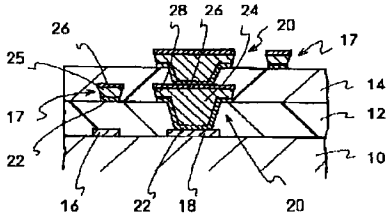
14

＊【図１１】図１０の製造工程よりも簡略化された従来の多層配線基板の製造工程を説明する工程図である。

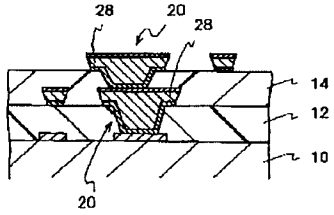
【符号の説明】

１０　絶縁性基板
１２、１４　絶縁性樹脂層
１６　絶縁性基板１０上に形成された導体パターン
１７　導体パターン
１８　絶縁性基板１０上に形成されたランド部
２０　ビア部
２２　密着バリア層
２４、２５　金属層
２６　バリア層
＊　２８　ランド部

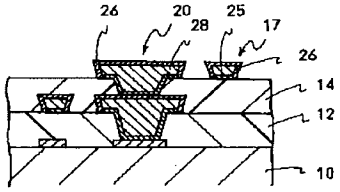
【図１】



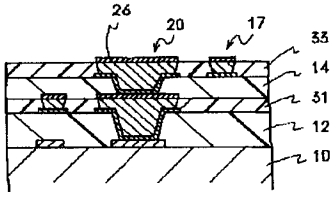
【図２】



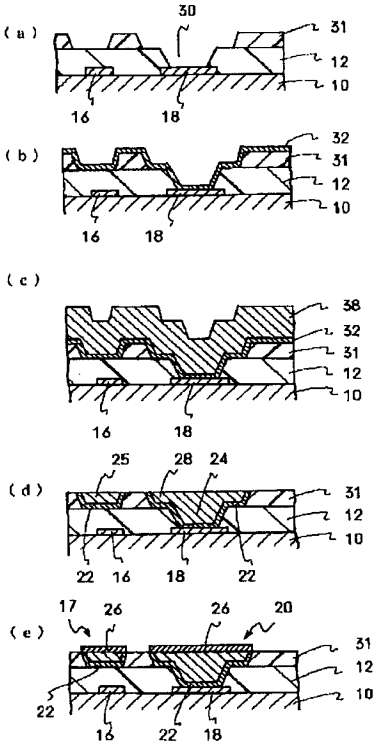
【図３】



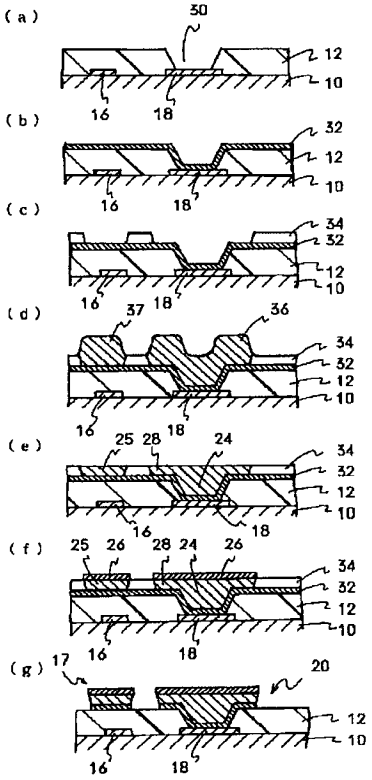
【図４】



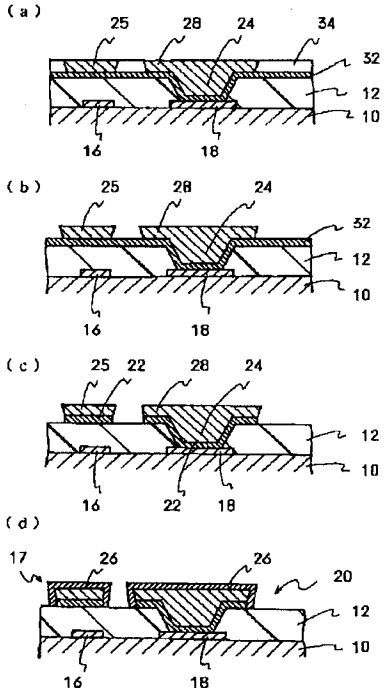
【図８】



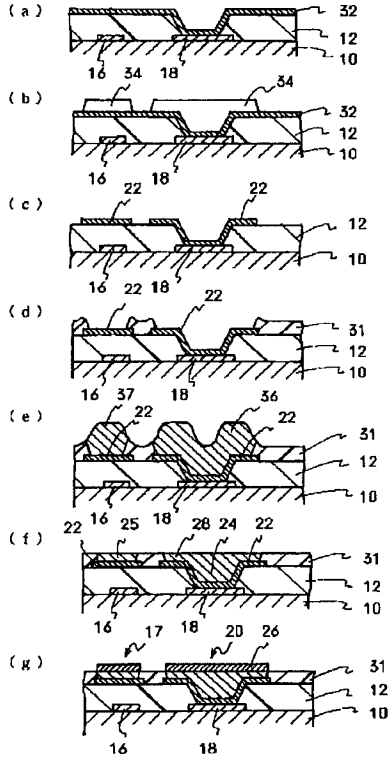
【図５】



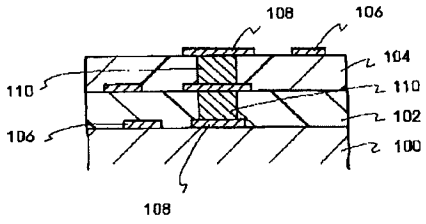
【図6】


(a)
25 28 24 34
32
12
10
16 18
(b)
25 28 24
32
12
10
16 18
(c)
25 22 28 24
12
10
16 22 18
(d)
17 26 26 20
12
10
16 18

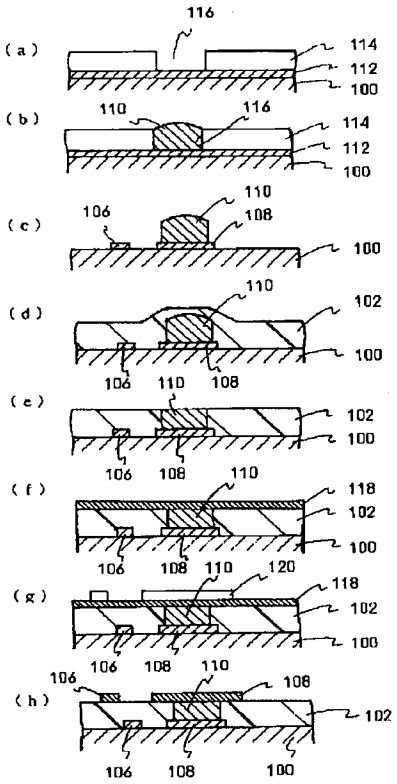
【図7】


(a)
32
12
10
16 34 18
(b)
34
32
12
10
16 18
(c)
22 22
12
10
16 22 18
(d)
22
31
12
10
16 37 18 36
(e)
22 22
31
12
10
22 16 25 18 28 24 22
(f)
31
12
10
16 17 18 20 26
(g)
31
12
10
16 18

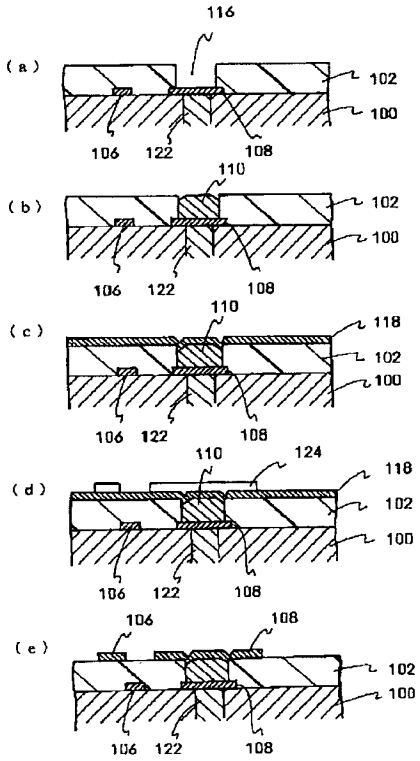
【図9】


108 106
104
110
110
102
106
100
108

【図１０】


(a)
116
114
112
100
(b)
110
116
114
112
100
(c)
106
110
108
100
(d)
110
102
100
106
110
108
(e)
102
100
106
108
110
(f)
118
102
100
106
108
110
120
(g)
118
102
100
106
108
110
(h)
106
108
102
106
108
100

【図１１】


(a)
116
102
100
106
122
108
(b)
110
102
100
106
122
108
(c)
110
118
102
100
106
122
108
(d)
110
124
118
102
100
106
122
108
(e)
106
108
102
100
106
122
108

【公報種別】特許法第１７条の２の規定による補正の掲載
【部門区分】第７部門第２区分
【発行日】平成１３年８月３日（２００１．８．３）

【公開番号】特開平７－７９０７８
【公開日】平成７年３月２０日（１９９５．３．２０）
【年通号数】公開特許公報７－７９１
【出願番号】特願平５－２２３４１６
【国際特許分類第７版】
H05K 3/46
【ＦＩ】
H05K 3/46 N

【手続補正書】
【提出日】平成１２年８月３０日（２０００．８．３０）
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】特許請求の範囲
【補正方法】変更
【補正内容】
【特許請求の範囲】
【請求項１】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板において、
該ビア部が、前記導体パターンが形成された絶縁性基板又は絶縁性樹脂層の表面上に積層された次層の絶縁性樹脂層を貫き、前記導体パターンのランド部が露出する貫通孔に、めっき充填されて形成された金属層と、前記金属層から延出されて絶縁性樹脂層の表面上に形成されたランド部とから成り、
少なくとも前記絶縁性樹脂層と接触するビア部の接触面に、絶縁性樹脂層とビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層が形成されていることを特徴とする多層配線基板。
【請求項２】　ビア部を形成するランド部の全表面が、前記ビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層によって覆われている請求項１記載の多層配線基板。
【請求項３】　絶縁性樹脂層の同一表面に形成された導体パターンと導体パターンとの間、及び導体パターンとビア部を構成するランド部との間に、絶縁性樹脂から成る段差防止層が形成されている請求項１記載の多層配線基板。
【請求項４】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、
該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成する貫通孔を穿設した後、前記貫通孔の底面及び壁面を含む前記絶縁性樹脂層の全表面に、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層を形成し、
次いで、前記密着バリア層上に形成された所定高さのレジスト層にパターニングして得られた、導体パターン及びビア部を形成する部分で且つ密着バリア層の露出部分に、めっきにより所定厚さの金属層を形成せしめ、
その後、前記金属層に研磨処理を施して平坦化した後、前記レジスト層を除去することによって露出した、前記密着バリア層の露出部分を除去して導体パターン及びビア部を形成することを特徴とする多層配線基板の製造方法。
【請求項５】　めっきにより形成した所定厚さの金属層に研磨処理を施して平坦化した金属層面に、前記金属層を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成した後、レジスト層を除去することによって露出した密着バリア層の露出部分を除去して導体パターン及びビア部を形成する請求項４記載の多層配線基板の製造方法。
【請求項６】　めっきにより形成した所定厚さの金属層に研磨処理を施して平坦化した後、レジスト層を除去して露出した密着バリア層の露出部分を除去して形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成する請求項４記載の多層配線基板の製造方法。

【請求項７】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、
該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成する貫通孔を穿設した後、前記貫通孔の底面及び壁面を含む前記絶縁性樹脂層の全表面に、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層を形成し、
次いで、前記導体パターン及びビア部が形成される部分の密着バリア層が残留するように、前記密着バリア層にパターニングを施した後、前記導体パターンを形成する部分の密着バリア層とビア部を形成する部分の密着バリア層が露出するように、絶縁性樹脂から成る所定高さの段差防止層を形成せしめ、
その後、密着バリア層が露出した導体パターン及びビア部を形成する部分に、めっきによって所定厚さの金属層を形成し、前記金属層に研磨処理を施して平坦化して導体パターン及びビア部を形成することを特徴とする多層配線基板の製造方法。
【請求項８】　研磨処理を施して平坦化した導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成する請求項７記載の多層配線基板の製造方法。
【請求項９】　絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、
該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成する貫通孔を穿設した後、前記導体パターンを形成する部分とビア部を形成する部分が露出するように、絶縁性樹脂から成る所定高さの段差防止層を形成し、
次いで、前記貫通孔の底面及び壁面を含む前記絶縁性樹脂層と段差防止層との全表面に亘って、前記絶縁性樹脂層とビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層を形成した後、前記密着バリア層上に、めっきによって所定厚さの金属層を形成せしめ、
その後、前記金属層に研磨処理を施して平坦化して導体パターン及びビア部を形成することを特徴とする多層配線基板の製造方法。
【請求項１０】　研磨処理を施して平坦化した導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成する請求項９記載の多層配線基板の製造方法。
【手続補正２】
【補正対象書類名】明細書
【補正対象項目名】０００６
【補正方法】変更
【補正内容】
【０００６】
【課題を解決するための手段】本発明者は、前記目的を達成すべく検討を重ねた結果、ビア部用貫通孔に電解めっきによって金属を充填してビア部を形成する際に、ビア部と導体パターンとを同時に形成することによって、工程の短縮化や簡略化が可能となること、及び絶縁性樹脂層と接触するビア部の裏面側に、絶縁性樹脂層とビア部との密着性向上を図ると共に、ビア部を形成する金属の絶縁性樹脂層への拡散防止を図り得る密着バリア層を形成することによって、ビア部と絶縁性樹脂層との剥離や絶縁性樹脂層の絶縁性能の低下等を解消し得ることを見出し、本発明に到達した。すなわち、本発明は、絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板において、該ビア部が、前記導体パターンが形成された絶縁性基板又は絶縁性樹脂層の表面上に積層された次層の絶縁性樹脂層を貫き、前記導体パターンのランド部が露出する貫通孔に、めっき充填されて形成された金属層と、前記金属層から延出されて絶縁性樹脂層の表面上に形成されたランド部とから成り、少なくとも前記絶縁性樹脂層と接触するビア部の接触面に、絶縁性樹脂層とビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層が形成されていることを特徴とする多層配線基板にある。かかる構成の多層配線基板において、ビア部を形成するランド部の全表面が、前記ビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層で覆うことによって、ランド部の表面から絶縁性樹脂層への金属の拡散を防止できる。
【手続補正３】
【補正対象書類名】明細書
【補正対象項目名】０００７
【補正方法】変更
【補正内容】
【０００７】また、本発明は、絶縁性基板上に複数層の絶縁性樹脂層が積層され、且つ前記絶縁性基板及び絶縁

性樹脂層の各々の表面側に形成された導体パターンと、互いに異なる絶縁性樹脂層の表面側に形成された所定の導体パターン同士を連結するように、前記絶縁性樹脂層を貫いて形成された金属から成るビア部とを具備する多層配線基板を製造する際に、該絶縁性基板又は絶縁性樹脂層の表面に形成された導体パターンのランド部を覆う次層の絶縁性樹脂層に、前記ランド部が露出して底面を形成する貫通孔を穿設した後、前記貫通孔の底面及び壁面を含む前記絶縁性樹脂層の全表面に、絶縁性樹脂層と前記ビア部との密着性向上及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層を形成し、次いで、前記密着バリア層上に形成された所定高さのレジスト層にパターニングして得られた、導体パターン及びビア部を形成する部分で且つ密着バリア層の露出部分に、めっきにより所定厚さの金属層を形成せしめ、その後、前記金属層に研磨処理を施して平坦化した後、前記レジスト層を除去することによって露出した、前記密着バリア層の露出部分を除去して導体パターン及びビア部を形成することを特徴とする多層配線基板の製造方法でもある。

【手続補正４】
【補正対象書類名】明細書
【補正対象項目名】０００８
【補正方法】変更
【補正内容】
【０００８】かかる構成の多層配線基板の製造方法において、めっきにより所定厚さの金属層を形成せしめた後、前記金属層に研磨処理を施して平坦化し、その後、前記レジスト層を除去して露出した密着バリア層の露出部分を除去して形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成することによって、導体パターン及びビア部の露出表面をバリア層で覆うことができる。また、導体パターン及びビア部が形成される部分の密着バリア層が残留するように、前記密着バリア層にパターニングを施した後、前記導体パターンを形成する部分の密着バリア層とビア部を形成する部分の密着バリア層との間に、絶縁性樹脂から成る所定高さの段差防止層を形成せしめ、その後、密着バリア層が露出して導体パターン及びビア部を形成する部分に、めっきによって所定厚さの金属層を形成せしめた後、前記金属層に研磨処理を施して平坦化することにより形成された導体パターン及びビア部の表面に、前記導体パターン及びビア部を形成する金属の絶縁性樹脂層への拡散防止を図るバリア層を形成することによって、ランド部及び導体パターンが厚くても多層配線基板の平坦性を確保できる。

【手続補正５】
【補正対象書類名】明細書
【補正対象項目名】００１０
【補正方法】変更
【補正内容】
【００１０】
【作用】本発明によれば、絶縁性樹脂層と接触するビア部の裏面側に形成された、絶縁性樹脂層と金属層との密着性向上及び金属層を形成する金属の絶縁性樹脂層への拡散防止を図る密着バリア層によって、ビア部と絶縁性樹脂層との剥離及び絶縁性樹脂層の絶縁性低下を解消することができる。また、ビア部用貫通孔が絶縁性樹脂層の裏面側に形成された導体パターンのランド部が底面に露出する貫通孔には、均一厚さの密着バリア層をスパッタ等によって容易に形成することができる。更に、貫通孔にめっきによって金属を充填してビア部を形成する際に、同時に導体パターンを形成することができ、ビア部を形成する工程と導体パターンを形成する工程とが別工程である従来の製造方法に比較して、工程を著しく簡略化することができる。